INSTALLATION RESTORATION PROGRAM

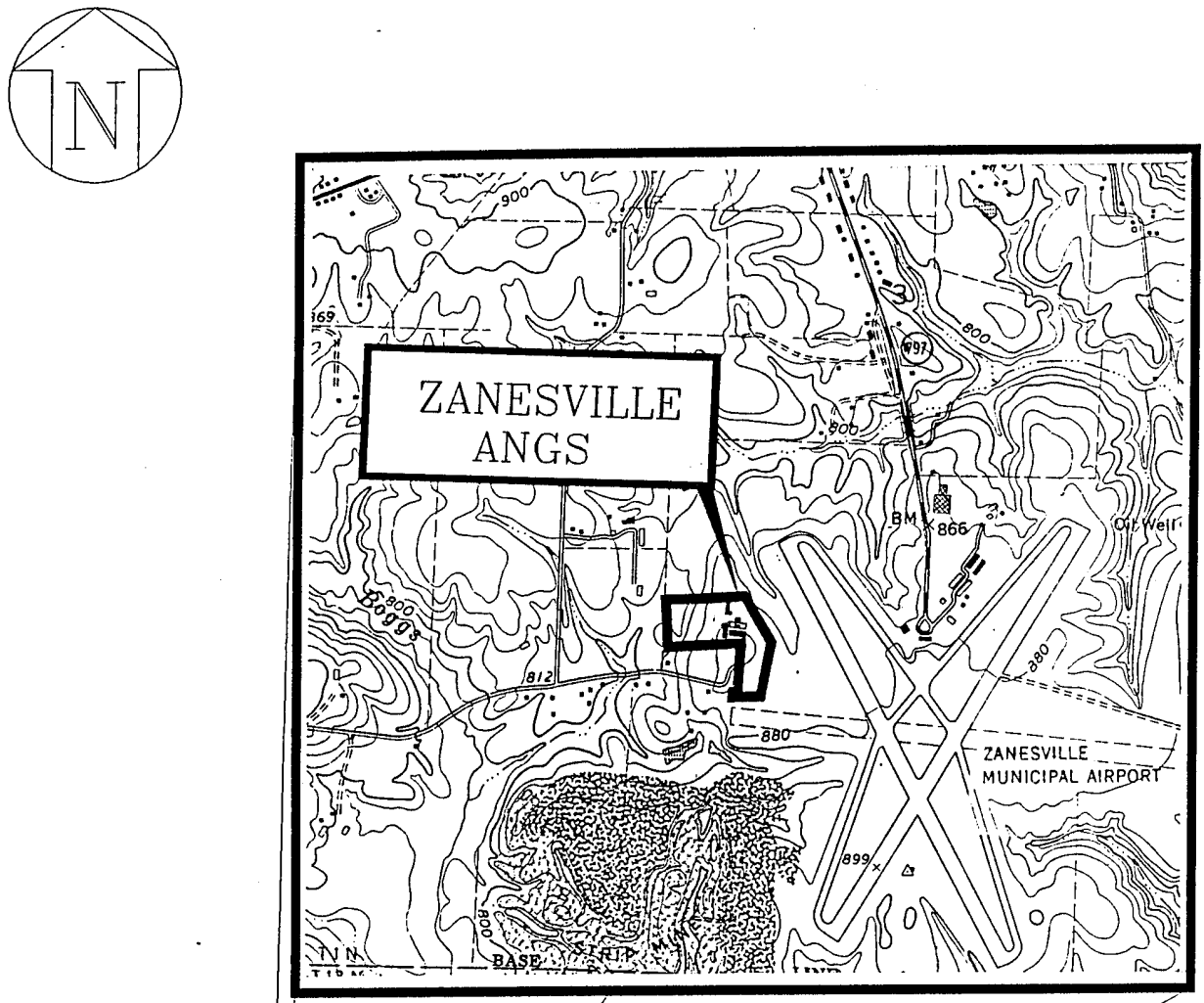
PRELIMINARY ASSESSMENT / SITE INSPECTION

VOLUME I

220th ENGINEERING INSTALLATION SQUADRON
ZANESVILLE AIR NATIONAL GUARD STATION
OHIO AIR NATIONAL GUARD
ZANESVILLE, OHIO

MARCH 1995

AIR NATIONAL GUARD READINESS CENTER
ANDREWS AFB, MARYLAND



OHIO

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SCALE IN FEET

SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC MAP, ZANESVILLE EAST, OHIO, 1987.

INSIDE FRONT COVER

P\ZANES\COVER

STATION LOCATION MAP

220th EIS, Zanesville ANGS

Zanesville, Ohio

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PRELIMINARY ASSESSMENT / SITE INSPECTION REPORT FOR THE 220TH ENGINEERING INSTALLATION SQUADRON, OHIO AIR NATIONAL GUARD, ZANESVILLE AIR NATIONAL GUARD STATION, ZANESVILLE, OHIO. TWO AREAS OF CONCERN (AOCs) AOC-A - THE MOTOR POOL WASHDOWN AREA AND AOC-B - THE BATTERY NEUTRALIZATION AREA WERE INVESTIGATED. NO FURTHER ACTION WAS RECOMMENDED FOR EITHER AOC.

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INSTALLATION RESTORATION PROGRAM

PRELIMINARY ASSESSMENT / SITE INSPECTION

VOLUME I

220th ENGINEERING INSTALLATION SQUADRON
ZANESVILLE AIR NATIONAL GUARD STATION
OHIO AIR NATIONAL GUARD
ZANESVILLE, OHIO

MARCH 1995

Prepared For

AIR NATIONAL GUARD READINESS CENTER
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LIST OF ACRONYMS

ANG	Air National Guard
ANGRC	Air National Guard Readiness Center
ANGRC/CEVR	Air National Guard Readiness Center/Installation Restoration Program Branch
ANGB	Air National Guard Base
ANGS	Air National Guard Station
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground storage tank
ATHA	Ambient temperature headspace analysis
BH	Borehole
BLS	Below Land Surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DOT	Department of Transportation
DRMO	Defense Reutilization and Marketing Office
EIS	Engineering Installation Squadron
GC	Gas Chromatograph
GNF	Glenford-Newark-Fitchville Association
GPM	Gallons per minute
GS	Groundwater Sample
HM/HW	Hazardous materials/hazardous wastes
HRS	Hazard Ranking System
HSA	Hollow-stem auger
IRP	Installation Restoration Program
MOGAS	Motor Vehicle Gasoline
MSL	Mean Sea Level
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
PA	Preliminary Assessment
PAH	Polyaromatic Hydrocarbons
PA/SI	Preliminary Assessment/Site Inspection
PCE	Perchloroethylene
PID	Photoionization Detector
PPE	Personal protective equipment
PRG	Preliminary remediation goal
RANGB	Rickenbacker Air National Guard Base
RI/FS	Remedial Investigation/Feasibility Study
SARA	Superfund Amendments and Reauthorization Act of 1986
SI	Site Inspection
SVOC	Semivolatile Organic Compound

LIST OF ACRONYMS (Concluded)

TDS	Total dissolved solids
TPH	Total Petroleum Hydrocarbons
UNK	Unknown
USEPA	United States Environmental Protection Agency
UST	Underground storage tank
VOC	Volatile Organic Compound
WBG	Westmoreland-Berks-Guernsey Association
WZA	Wellston-Zanesville-Alford Association

INSTALLATION RESTORATION PROGRAM
PRELIMINARY ASSESSMENT/SITE INSPECTION

EXECUTIVE SUMMARY

1.0 INTRODUCTION

A Preliminary Assessment/Site Inspection (PA/SI) was conducted at the 220th Engineering Installation Squadron (EIS), Zanesville Air National Guard Station (ANGS), Zanesville, Ohio. The Air National Guard Readiness Center/Installation Restoration Program Branch (ANGRC/CEVR) authorized Operational Technologies Corporation (OpTech) to prepare a PA/SI Work Plan and conduct the SI at the Zanesville ANGS. A PA of the 220th EIS, Zanesville ANGS, was initiated by ANGRC and OpTech personnel in November 1993. Information obtained through interviews, review of station records, and field observations resulted in the identification of two potentially contaminated disposal and/or spill areas. These areas are designated as the Motor Pool Washdown Area of Concern (AOC), and the Battery Neutralization AOC. The SI was conducted as outlined in the PA/SI Work Plan submitted to ANGRC/CEVR in January 1994 and approved in April 1994. The field work commenced at the 220th EIS on 1 June 1994 and was completed on 3 June 1994.

2.0 AREAS OF CONCERN

The Motor Pool Washdown AOC (AOC-A) is located northeast of Building 5 (see Inside Back Cover Figure). AOC-A borders the outside edge of the asphalt in front of the vehicle maintenance bays of Building 5, and is L-shaped. The area is covered by gravel and small amounts of grass, and a shallow open drainage channel drains surface runoff across AOC-A in a northerly direction, from the pavement to the grass-covered area north of this AOC.

The Battery Neutralization AOC (AOC-B) is located just off the west edge of the pavement northwest of Building 1 and southwest of Building 5. The area is completely covered with gravel.

3.0 SITE INSPECTION FINDINGS

Fourteen soil samples from AOC-A were submitted for laboratory analysis of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), priority pollutant metals, and total petroleum hydrocarbons (TPH). Six soil samples from AOC-B were submitted for analysis

of lead. Acetone was detected in ten of the 14 samples at AOC-A; its presence is attributable to laboratory contamination since it is a common laboratory solvent. Tetrachloroethene was detected in two of the 14 soil samples, at concentrations which did not exceed Ohio Environmental Protection Agency (OEPA)-provided Preliminary Remediation Goals (PRGs). SVOCs were detected in two of 14 soil samples at AOC-A. The SVOCs detected consisted of eight polyaromatic hydrocarbons (PAH) which ranged in concentration from 720 micrograms per kilogram (μg/kg) to 4,000 μg/kg. The highest total PAH concentration was 16,200 μg/kg. Benzo(a)pyrene, at 2,100 μg/kg in soil boring location A-006BH, exceeded the OEPA-provided PRG of 88 μg/kg. TPH contamination was detected in seven of 14 soil samples at AOC-A. Two TPH concentrations, 1,600 milligrams per kilogram (mg/kg) at soil boring A-004BH (0.5 to 1.5 feet below land surface (BLS)) and 370 mg/kg at location A-005BH (0.5 - 1.5 feet BLS), exceeded the OEPA TPH limit of 105 mg/kg. In all but one case, the PAH and TPH contamination detected at AOC-A occurred at the surface interval in respective soil borings. Ten priority pollutant metals were detected in the soil samples at AOC-A. The average value detected was below or within the range of naturally occurring concentrations of each respective metal, except for zinc, which was slightly higher than the naturally occurring level. The average concentration of two of the metals, arsenic at 7.6 mg/kg and beryllium at 0.79 mg/kg, exceeded OEPA PRGs of 0.37 mg/kg and 0.15 mg/kg, respectively. The PRGs for these two metals are significantly less than their naturally occurring levels for east-central Ohio, 10 mg/kg for arsenic and 1.0 to 1.5 mg/kg for beryllium. Lead was detected in all six soil samples at AOC-B. The average and maximum concentrations detected were within the range of naturally occurring levels for east-central Ohio.

4.0 CONCLUSIONS

One PAH compound (benzo(a)pyrene) detected in one soil sample exceeded OEPA-provided PRGs. The OEPA limit for TPH in soil was exceeded at two soil boring locations. The concentrations of arsenic and beryllium in all soil samples exceeded the OEPA-provided PRGs, but were within the range of naturally occurring levels of these metals for east-central Ohio. The average and maximum concentrations of zinc were slightly below naturally occurring levels.

5.0 RECOMMENDATIONS

5.1 MOTOR POOL WASHDOWN AOC

Although action levels were exceeded for benzo(a)pyrene, TPH, arsenic and beryllium in two soil samples, the magnitude and extent of contamination has been sufficiently determined, and

groundwater is not at risk. Therefore, based on the results of the PA/SI conducted, further investigation is not required at this AOC.

5.2 BATTERY NEUTRALIZATION AOC

Based on the results of the PA/SI conducted, lead was not detected above naturally occurring levels for the area. Therefore, no additional IRP activities are warranted at AOC-B.

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SECTION 1.0 INTRODUCTION

1.1 BACKGROUND

This Preliminary Assessment/Site Inspection (PA/SI) Report presents the results of the inspection activities conducted at the 220th Engineering Installation Squadron (EIS), Zanesville Air National Guard Station (ANGS), Zanesville, Ohio (see Inside Front Cover Figure). The Air National Guard Readiness Center/Installation Restoration Program Branch (ANGRC/CEVR) authorized Operational Technologies Corporation (OpTech) to prepare a PA/SI Work Plan and conduct the SI at the Zanesville ANGS. A PA of the 220th EIS, Zanesville ANGS, was initiated by ANGRC and OpTech personnel in November 1993. Information obtained through interviews, review of station records, and field observations resulted in the identification of two potentially contaminated disposal and/or spill areas. These areas are designated as the Motor Pool Washdown Area of Concern (AOC-A), and the Battery Neutralization AOC (AOC-B). The SI was conducted as outlined in the PA/SI Work Plan submitted to ANGRC/CEVR in January 1994 and approved in April 1994. The PA/SI is conducted under the authority of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986.

The Defense Environmental Restoration Program (DERP) was established in 1984 to promote and coordinate efforts for the evaluation and cleanup of contamination at Department of Defense (DoD) installations. On 23 January 1987, Presidential Executive Order 12580 was issued which assigned the responsibility to the Secretary of Defense for carrying out DERP within the overall framework of SARA and CERCLA. The Installation Restoration Program (IRP) was established under DERP to identify, investigate, and clean up contamination at installations. The IRP is focused on cleanup of contamination associated with past DoD activities to ensure that threats to public health are eliminated and to restore natural resources for future use. The Air National Guard Readiness Center (ANGRC) manages the IRP and related activities for Air National Guard installations.

1.2 PURPOSE

The overall objective of the PA/SI was to identify and evaluate potential areas of concern associated with past waste handling procedures, disposal and spill areas. This objective has been met through the PA and SI activities. The PA consisted of personnel interviews and a records search designed to identify and evaluate past disposal and/or spill areas that might pose a potential and/or actual hazard to public health, public welfare, or the environment. The SI

consisted of field activities designed to confirm the presence or absence of contamination at the AOCs identified in the PA. In addition, this PA/SI Report provides specific information required to complete the Hazard Ranking System (HRS) "Data Requirements for Federal Facility Docket Sites" (Appendix A).

The specific objectives of the PA/SI were to:

- Identify all operations at the station that have used hazardous materials or have generated hazardous waste.

- Obtain available geological, hydrological, meteorological, and environmental data and define hydrogeologic conditions that affect contaminant migration, containment, or cleanup.

- Provide data to assist in determining the presence, type, magnitudes, or absence of contamination at AOCs.

- Support site-specific decisions, such as no further action or identification of those AOCs requiring further investigation in the form of a Remedial Investigation/Feasibility Study (RI/FS).

1.3 SCOPE

The scope of work for the PA/SI was to identify potential areas of concern and to confirm the presence or absence of contamination associated with past hazardous material and hazardous waste handling and disposal. The scope was limited to areas under the primary control of Zanesville ANGS. Also, the scope was limited in that the extent of contamination at AOCs and the extent of possible threats to human health and the environment were not determined during this PA/SI. Therefore, within these limits, the PA/SI included the following actions: the identification of AOCs at or under primary control of the ANGS and the evaluation of potential receptors; the definition of the nature of releases at identified AOCs; the confirmation of the absence or presence of soil contamination; and description of the geologic conditions of the installation study area, including the subsurface soil types and the presence or absence of hydrogeologic confining layers. The results of this PA/SI provide the technical basis needed to reach a decision point for each AOC.

1.4 METHODOLOGY

1.4.1 Preliminary Assessment Process

The purpose of the PA is to identify and evaluate the historical use, disposal, or release of hazardous materials and hazardous wastes (HM/HW) on an installation that may pose a potential or actual hazard to public health, public welfare, or the environment. A flow chart of the PA Methodology employed at Zanesville ANGS is presented in Figure 1.1.

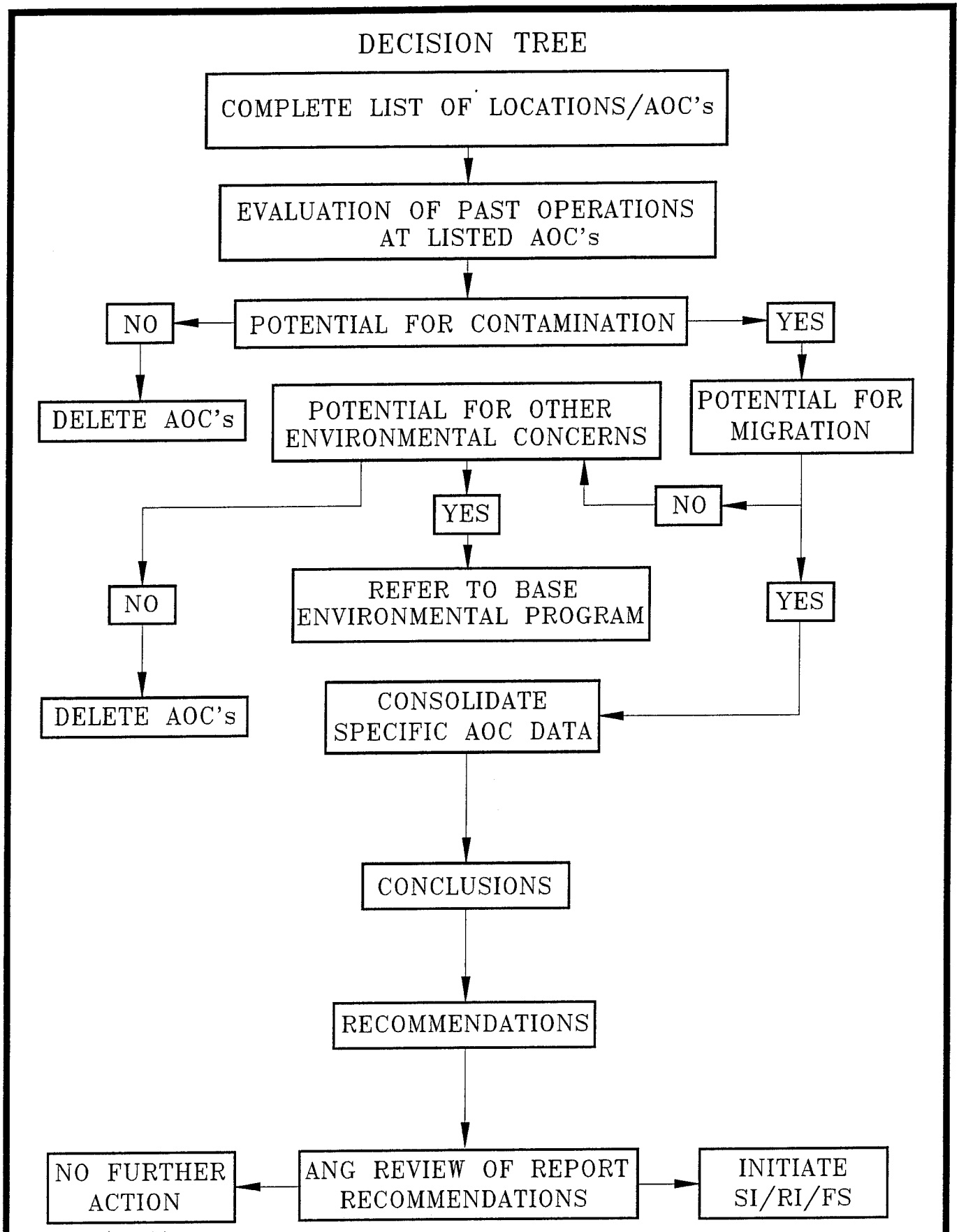
The PA began with a visit to Zanesville ANGS to evaluate both past and present HM/HW handling procedures in order to determine whether any environmental contamination has occurred. The evaluation of past HM/HW handling practices was facilitated by interviews with thirteen station personnel familiar with the various operating procedures at the station. These interviews defined the areas at the station where HM/HW was stored, spilled, disposed of, or otherwise released into the environment.

Historic records from station files were collected and reviewed to supplement the information obtained from the interviews. Using this information, a list of two past waste spill/disposal areas on the station was identified for further evaluation. A general survey tour of the identified spill/disposal areas and the station was conducted to determine the presence of visible contamination and to help assess the potential for contaminant migration. Particular attention was given to locating nearby drainage ditches, surface water bodies, and residences.

Detailed geological, hydrological, meteorological, developmental (land use and zoning), and environmental data for the Zanesville area were also obtained from appropriate Federal, State, and local agencies. Following a detailed analysis of all the information obtained, the two AOCs were identified, described in detail and recommended for SI activities included in the PA/SI Work Plan.

1.4.2 Site Inspection Process

The purpose of the SI was to perform field activities to confirm the presence or absence of contamination at each of the identified AOCs. The SI was accomplished at Zanesville ANGS by drilling soil borings at the two AOCs, and collecting subsurface soil samples. These samples were field screened using a photoionization detector (PID) and a field gas chromatograph (GC), and were subsequently analyzed for laboratory parameters related to the suspected contaminants



SOURCE: ANGRC/CEVR, 1993.

FIGURE 1.1

R\ZANES\PRELIM

PRELIMINARY ASSESSMENT METHODOLOGY CHART
220th EIS, Zanesville ANGS
Zanesville, Ohio

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identified in the PA. The findings of both the initial PA station visit and the SI field activities are presented in this PA/SI Report.

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SECTION 2.0 INSTALLATION DESCRIPTION

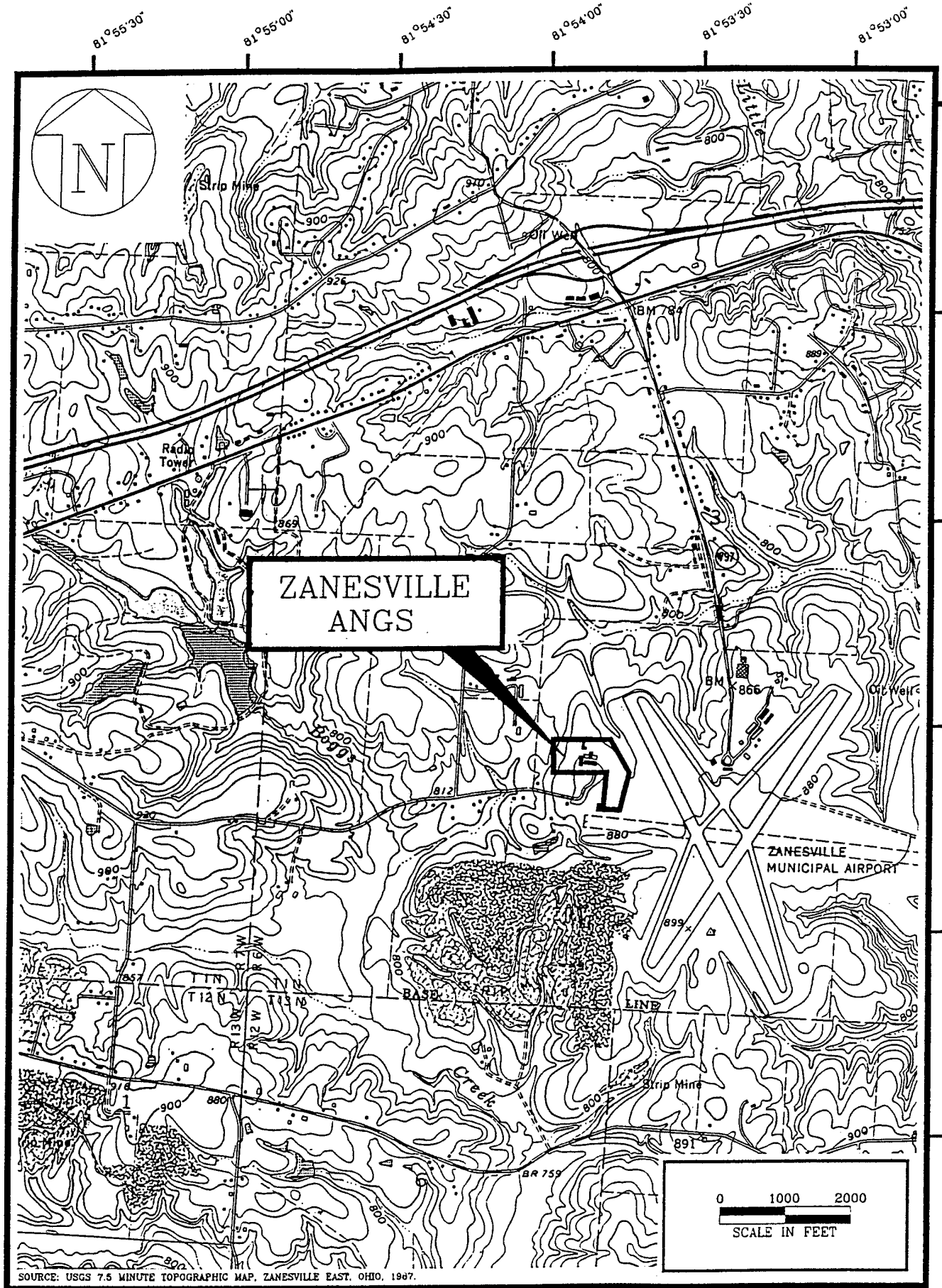
2.1 LOCATION

Zanesville ANGS is located at the Zanesville Municipal Airport, southwest quadrant, Section 3, Township 1N, Range 6W, Muskingum County, Ohio (see Figure 2.1). The station is approximately 5.3 miles east of the City of Zanesville, Ohio. The station consists of 11.88 acres of land which is leased from the City of Zanesville. Figure 2.2 illustrates the location and boundaries of the station.

The station is a geographically separated unit with host support provided by Rickenbacker Air National Guard Base (RANGB), Columbus, Ohio. Zanesville ANGS consists of 5 buildings on its 11.88 acres, as shown in Figure 2.2: Main Administration, Dining Hall, and Commander's Facility (Building 1), Mobility Storage (Buildings 2 and 3), Motor Vehicle Facility (Building 5), and Station Supply (Building 8). Zanesville ANGS has a weekday work population of 17 people; during training weekends, the population rises to 180.

2.2 ORGANIZATION AND HISTORY

The station was established in 1951 as the 105th Communications Squadron with 14 personnel assigned. The unit's designation changed to the 268th Communications Squadron in 1952, the 220th Electronics Installation Squadron in 1971, and finally the 220th Engineering Installation Squadron in 1982. The unit's mission is to engineer and install communications computer equipment and systems to support theater and tactical forces deployed and to provide commanders with the capability to sustain connectivity among tactical assets. The gaining Major Air Command is the Air Force Material Command. Since the original station construction, ANG sponsored facility improvements (see Figure 2.2) have included the west wing of Building 1 in 1971, the Motor Vehicle Facility in 1979, and the Building 3 Storage Facility in 1991.



SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC MAP, ZANESVILLE EAST, OHIO, 1967.

FIGURE 2.1

P\ZANES\TOPOMAP

7.5' TOPOGRAPHIC MAP

220th EIS, Zanesville ANGS
Zanesville, Ohio

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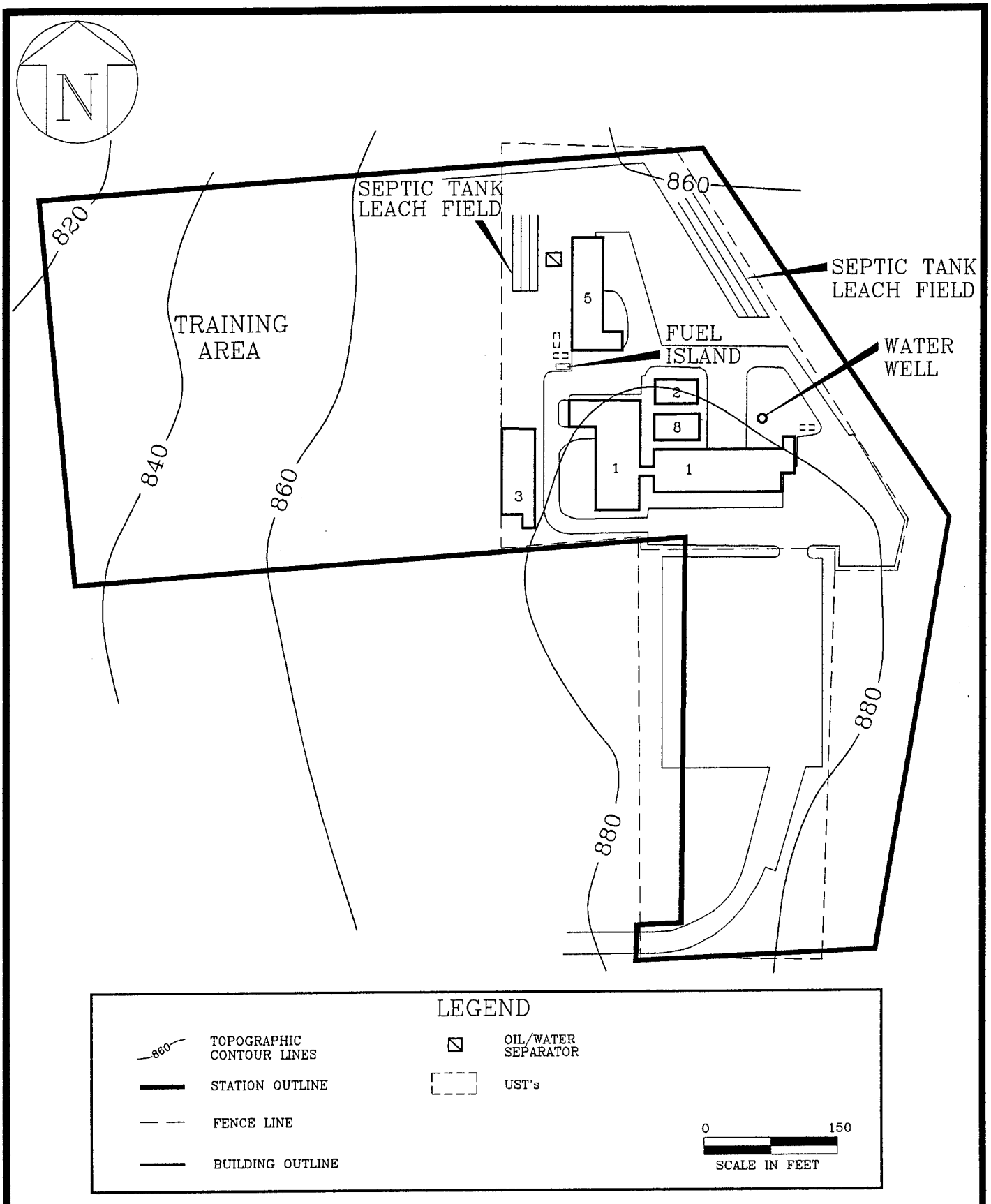

SOURCE: 220th EIS MAP, 1993.

FIGURE 2.2

P\ZANES\INBACK

ZANESVILLE ANGS
220th EIS, Zanesville ANGS
Zanesville, Ohio

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SECTION 3.0 ENVIRONMENTAL SETTING

The State of Ohio is located in the midwest region of the United States between 40° and 41° North Latitude. Located west of the Appalachian Mountains, Ohio has a climate essentially continental in nature, characterized by moderate extremes of heat and cold, and wetness and dryness. The topography of Ohio ranges in elevation from 430 feet above sea level at the junction of the Great Miami and Ohio rivers up to 1,550 feet on a summit near Bellefontaine, Ohio. The Zanesville ANGS is located in Muskingum County, which resides in the Allegheny Plateau region of Eastern Ohio. The elevation at the Zanesville ANGS is approximately 880 feet (see Figure 2.1). Topography within the Allegheny Plateau consists generally of steep and rugged hills, narrow and broad ridgetops, and mostly V-shaped stream valleys with narrow flood plains below. The boundary of glacial activity in this region of Ohio lies immediately west of Muskingum County.

3.1 METEOROLOGY

The climate of the Zanesville area is characterized by moderately warm and humid summers, and reasonably cold winters. In the summer, the daily temperature ranges from 61° F to 84° F, while in the winter, the daily temperature ranges from 19° F to 36° F. Only occasionally do temperatures exceed 100° F in the summer or fall below 0° F in the winter. The average annual rainfall for the Zanesville area is 38.4 inches. Monthly rainfall averages range from a low of 2.25 inches in October to 4.42 inches in July. Net precipitation varies from year to year; however, a range for annual net precipitation is from 24 to 27 inches.

3.2 GEOLOGY

The geology of the Zanesville and Muskingum County area is dominated by the presence of sedimentary rocks of Mississippian and Pennsylvanian age. These rocks are either exposed at the surface or are covered by a layer of soil or alluvial deposits (see Figure 3.1). The uppermost part of the Mississippian System is absent in Ohio because of nondeposition or erosion represented by the Mississippian/Pennsylvanian unconformity. In general, Ohio's Mississippian section consists of a sandstone/siltstone/shale sequence which, in some parts of southeastern Ohio, is capped by a carbonate unit, the Maxville Limestone, the youngest Mississippian rock unit in Ohio. At the base of the Mississippian system is the Bedford Shale formation, which is overlain by the Berea Sandstone, the most widespread and readily identifiable rock unit of Mississippian age. The Berea Sandstone is overlain by the Sunbury Shale, which in turn, is overlain by the Cuyahoga Formation (also known as "Big Injun"). The

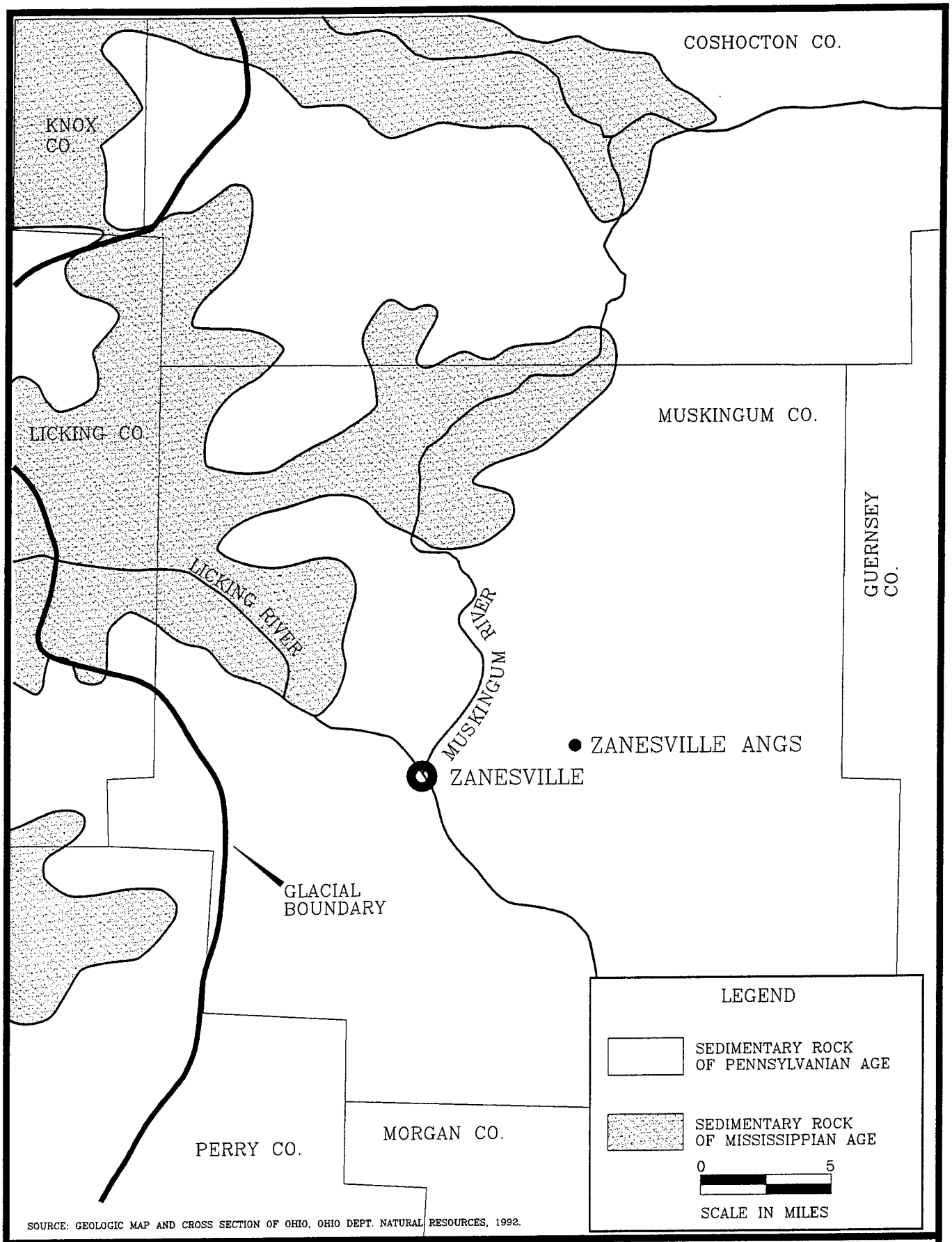

FIGURE 3.1

P\ZANES\GEOMAP

GEOLOGIC MAP OF THE VICINITY OF ZANESVILLE ANGS

220th EIS, Zanesville ANGS
Zanesville, Ohio

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JULY 1994

Cuyahoga Formation is primarily a conglomeratic sandstone that commonly includes interbedded siltstones and shales. The overlying Logan Formation consists of interbedded shale, siltstone, sandstone, and conglomerate.

The Pottsville Formation of the Pennsylvanian System overlies the Mississippian System. There is evidence that erosion of Mississippian rocks and deposition of Pottsville sediments were contemporaneous processes at many localities. Where the Maxville Limestone is not present, the sandstones and shales of Pennsylvanian age below the lowermost coal are not easily distinguished in the subsurface from Mississippian clastics. A generalized stratigraphic column which depicts the order of these sedimentary rocks is given in Figure 3.2. These rocks are nearly flat lying, with a slight southeasterly dip of both Mississippian and Pennsylvanian rocks of approximately 20 to 30 feet per mile. These rocks are present to depths of approximately 1,300 feet below land surface (BLS) in the area of the Zanesville ANGS.

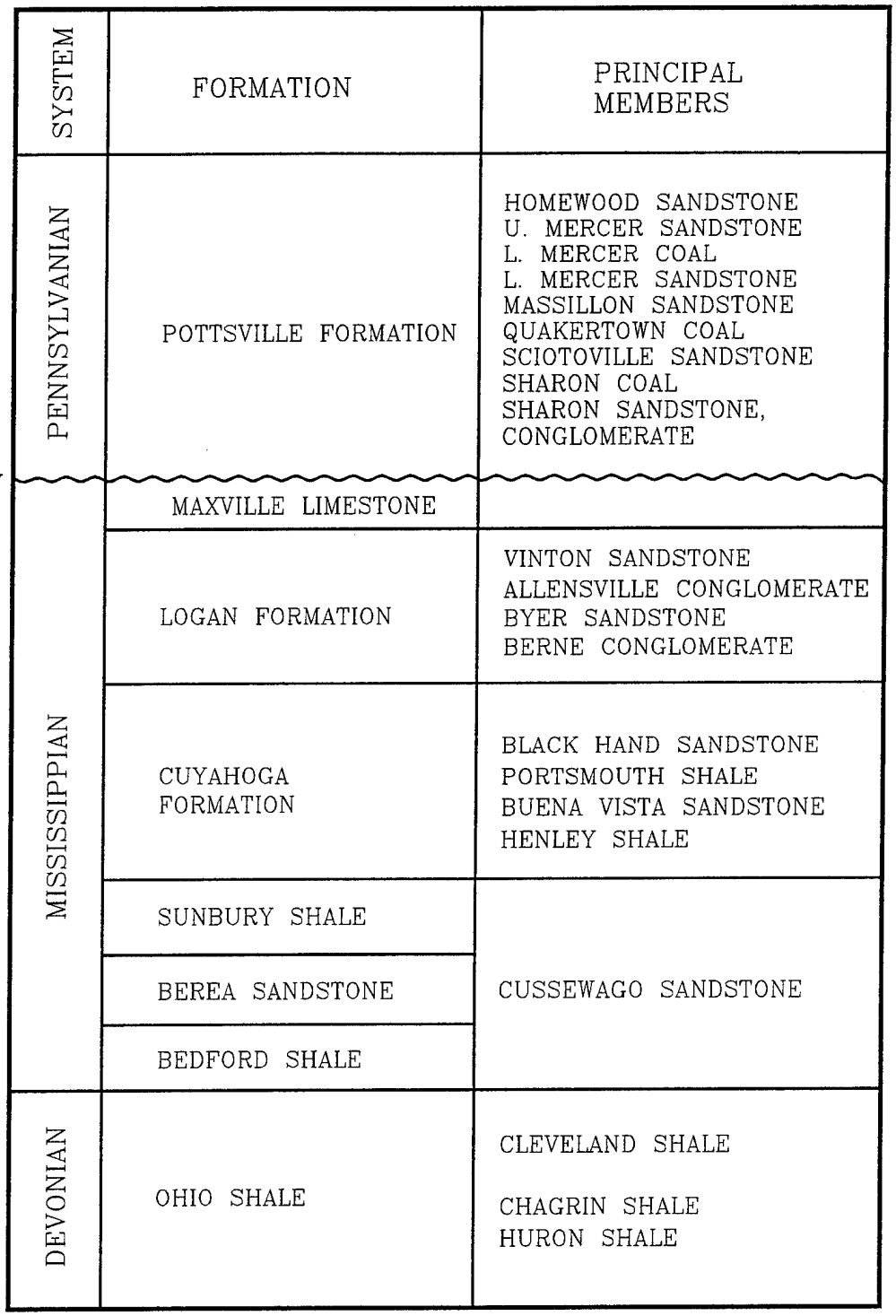
Over geologic time, crustal uplifting, weathering, erosion forces, and deposition of materials have shaped the surface topography. The eastern portion of Muskingum County, where the Zanesville ANGS is located, is typified by narrow ridges and valleys with steep slopes, while the central, western, and northern portions of the county have smoother and gentler slopes and valleys. Surface mining for coal occurs throughout the county; oil and gas fields are also present.

3.3 SOILS

The soil associated with virtually all of the Zanesville Municipal Airport, including the Zanesville ANGS, is known as the Wellston-Zanesville-Alford Association (see Figure 3.3). These soils originated from deposits of wind-blown silty material (loess) and in residuum weathered from underlying sandstone or siltstone. Soil composition and drainage information are given in Table 3.1.

3.4 SURFACE WATER HYDROLOGY

The Zanesville ANGS is located in the basin of the Muskingum River, which flows through the center of Zanesville, five miles east of the station (see Figure 3.4). The Muskingum River drains a large portion of east central Ohio, constituting a drainage basin of 8,051 square miles. The Muskingum River flows south from east central Ohio into the Ohio River.



SOURCE: MAJCHSZAK, 1984.

FIGURE 3.2

P\ZANES\GENSTRAT

GENERALIZED STRATIGRAPHIC COLUMN FOR THE ZANESVILLE AREA

220th EIS, Zanesville ANGS
Zanesville, Ohio

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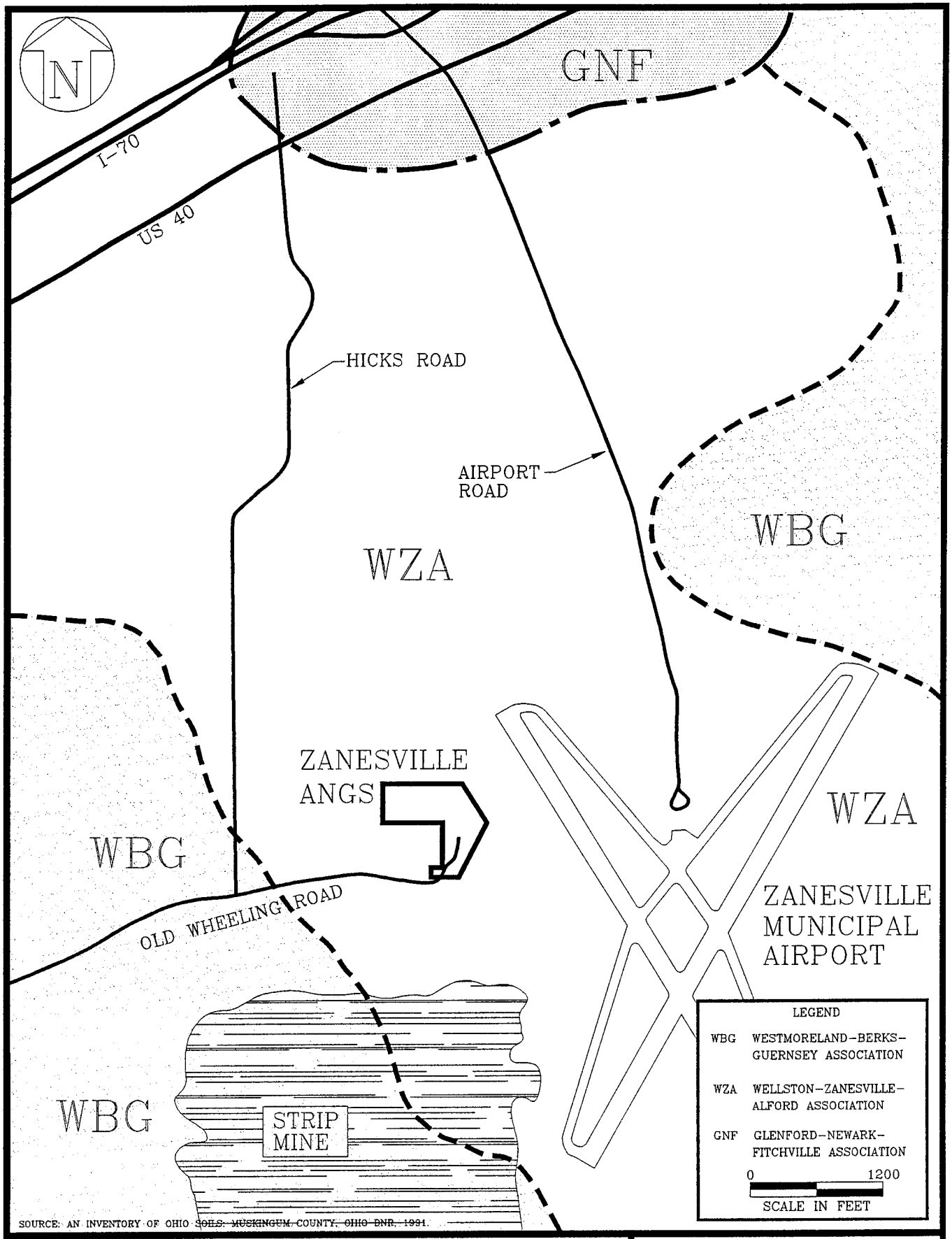

FIGURE 3.3

P\ZANES\SOILMAP

SOIL MAP

220th EIS, Zanesville ANGS

Zanesville, Ohio

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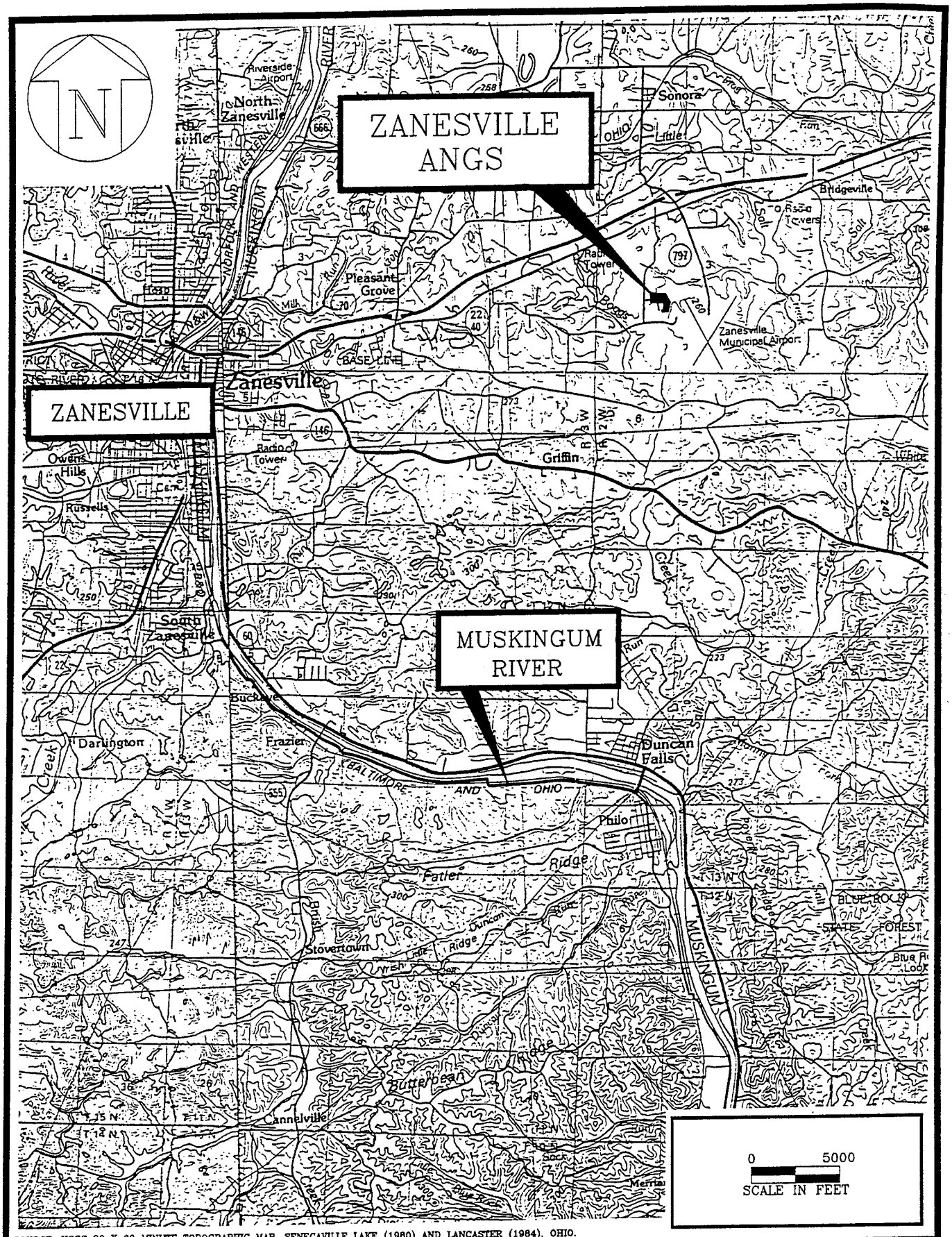

SOURCE: USGS 30 X 60 MINUTE TOPOGRAPHIC MAP, SENECAVILLE LAKE (1980) AND LANCASTER (1984), OHIO.

FIGURE 3.4

P\ZANES\ZANERIVR

ZANESVILLE ANGS AND MUSKINGUM RIVER VICINITY

220th EIS, Zanesville ANGS
Zanesville, Ohio

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MARCH 1994

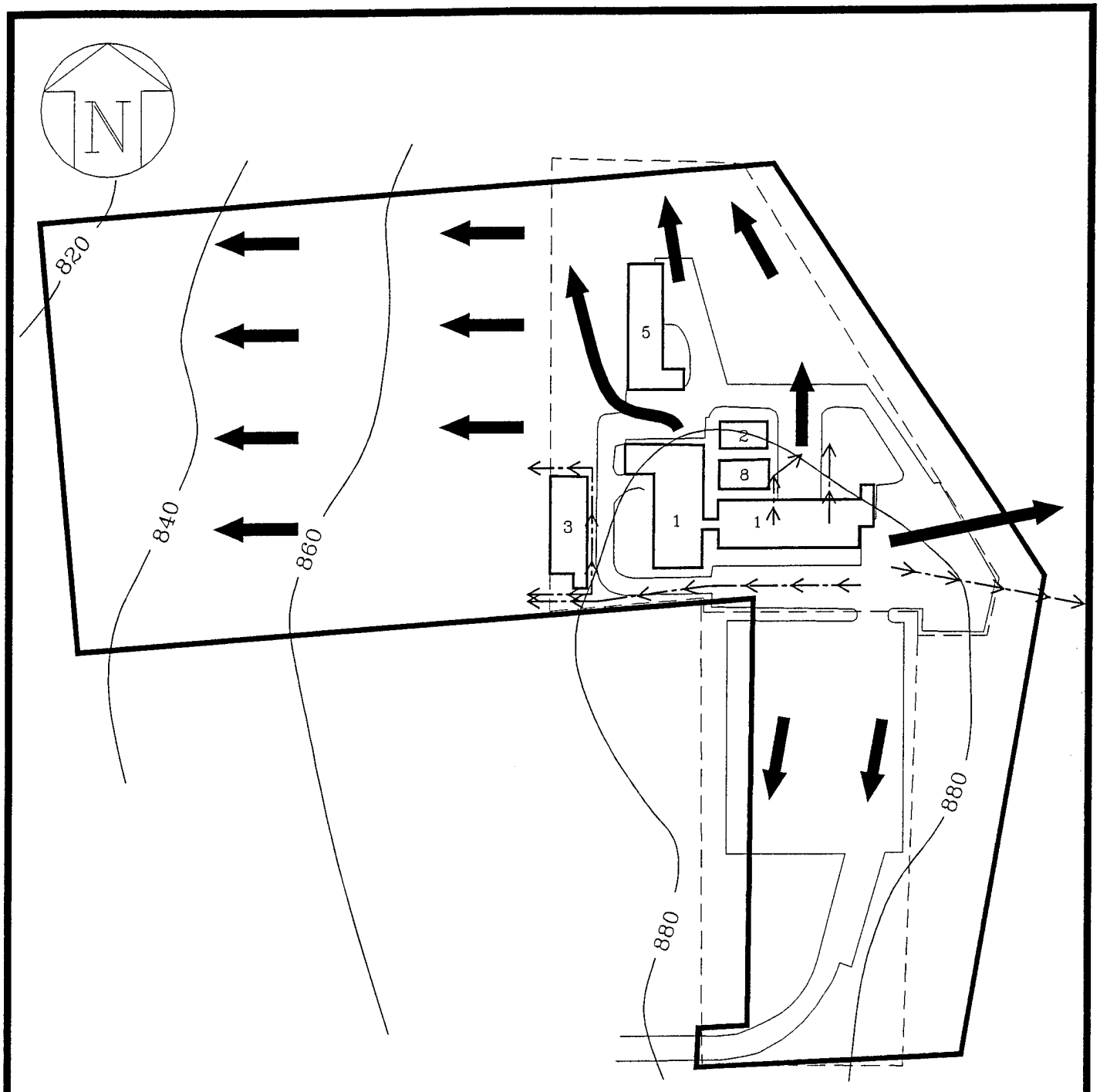
Table 3.1
Wellston-Zanesville-Alford Soil Profile
220th EIS, Zanesville ANGS, Zanesville, Ohio

Soil/Depth (inches)		Soil Description	Drainage Characteristic	Depth to Bedrock (inches)
Wellston	0-7	Friable silt loam	Well drained	48
	7-32	Friable silt loam/silty clay loam		
	32-48	Firm silty clay loam		
Zanesville	0-7	Friable silt loam	Moderate	>60
	7-28	Friable silt loam		
	28-45	Compact silt Loam/silty clay loam Fragipan	Moderately slow or slow	
	45-67	Firm loam & channery loam	Moderate or moderately slow	
	67-80	Friable or firm loam & channery loam		
Alford	0-10	Friable silt loam	Well drained	
	10-50	Friable silt loam	Moderate	>60
	50-80	Friable silt loam		

Source: An Inventory of Ohio Soils. Muskingum County, Ohio Department of Natural Resources, 1991.

Surface water at Zanesville ANGS is drained by storm sewers around Buildings 1 and 3 and across pavement or grass-covered areas elsewhere, as shown in Figure 3.5. Surface drainage is primarily to the north and west, as defined by the immediate topography at the station. Surface discharge to the west flows to a tributary of Boggs Creek which runs close to the far western boundary of the station (see Figure 3.6). Surface drainage to the north and east flows to a tributary of Little Salt Creek. Both Little Salt Creek and Boggs Creek feed into Salt Creek, which subsequently flows into the Muskingum River, roughly 10 miles downstream from the station.

The Zanesville ANGS obtained its water from 1952 to 1974 from a water well located just north of Building 1. No information is available from Zanesville ANGS, Rickenbacker Air National Guard Base (RANGB), or the Division of Water, Ohio Department Natural Resources (ODNR) regarding this well. Since 1974, the station has been served by the East Muskingum Water Authority and the station well has not been used for any purpose since that time. To date, the



LEGEND

- BASE OUTLINE
- FENCE LINE
- 860 TOPOGRAPHIC CONTOUR LINE
- STORM SEWER
- SURFACE RUNOFF
- BUILDING OUTLINE

0 150
SCALE IN FEET

SOURCE: 220th EIS MAP, 1993.

FIGURE 3.5

P\ZANES\DRAINAGE

STATION SURFACE DRAINAGE
220th EIS, Zanesville ANGS
Zanesville, Ohio

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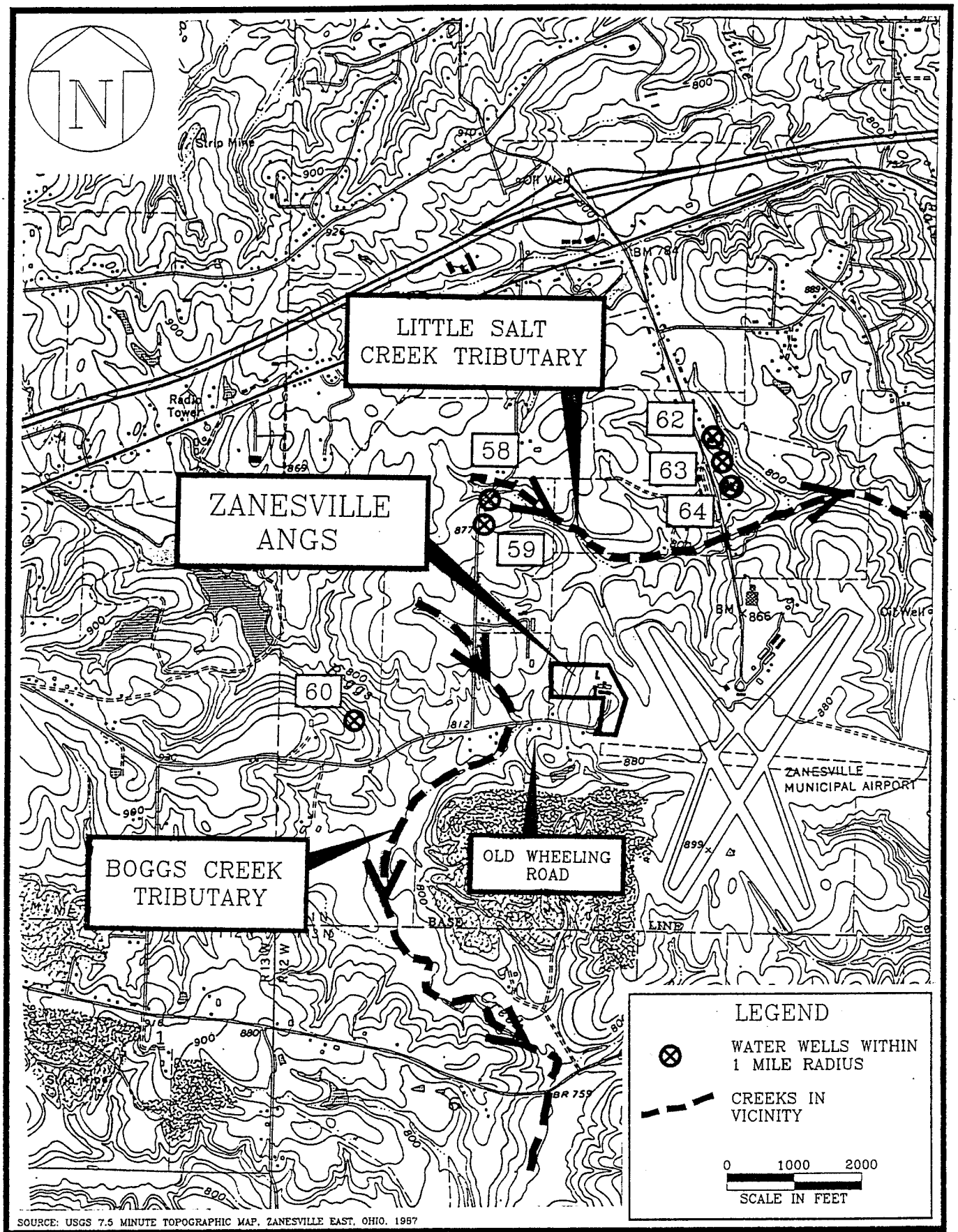

SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC MAP, ZANESVILLE EAST, OHIO, 1987

FIGURE 3.6

P\ZANES\WATERWEL

WATER WELL LOCATIONS AND AREA CREEK DRAINAGE

220th EIS, Zanesville ANGS

Zanesville, Ohio

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well has not been abandoned. Sanitary and industrial sewage has always been directed to the station's former two septic systems. This changed in the summer of 1994 with the installation of sewer lines at the station which provided connection to a high pressure sewage line presently located near the northwest boundary of the station.

3.5 HYDROGEOLOGY

The primary producing aquifer for potable water in Muskingum County is the Connoquenessing sandstone member of the Pottsville Formation in the Pennsylvanian System. The bedrock in the Zanesville area produces only low yields of water since the material is typically sandstone or shale having low permeability. Sustainable pumping rates are typically 5 gallons per minute (GPM) or less. Potable water is typically found in this aquifer between elevations of 700 feet above mean sea level (MSL) and 770-840 feet MSL. Below this elevation, the groundwater total dissolved solid (TDS) levels increase dramatically as the water becomes brine.

The ODNR, Division of Water identified six domestic wells within a one-mile radius of Zanesville ANGS (see Figure 3.6). Pertinent information from the well logs is provided in Table 3.2. The well logs do not provide information on the installed screens in these wells. All well logs reported encountering shale, sandstone, and some coal in drilling to depth.

Table 3.2
Domestic Water Wells in 1-Mile Radius
220th EIS, Zanesville ANGS, Zanesville, Ohio

Well No.	Drilling Information (feet BLS)			Well Information	
	Overburden Depth	Total Depth	Water Encountered	Static Water Level (feet BLS)	Pumping Rate (GPM)
58	10	140	25, 48, 122	35	5.0
59	12	122	50	32	1.5
60	UNK	200	55	57	1.83
62	15	78	29, 40	24	15
63	UNK	125	UNK	35	5
64	5	140	104	50	2

UNK – Unknown.
BLS – Below Land Surface.
GPM – Gallons Per Minute.
Source – Ohio Department of Natural Resources, Division of Water.

Station personnel and the East Muskingum Water Authority report that approximately ten households at the east end of Old Wheeling Road, just west of the station, are currently served

by individual domestic water wells, yet these wells were not identified by the ODNR Division of Water, and therefore, well logs are not available for them. The Water Authority reports that, to date, only three of these households have signed up for connection to a water line recently installed by the Authority.

3.6 CRITICAL HABITATS/ENDANGERED SPECIES

There are several endangered or threatened species in the vicinity of the Zanesville ANGS (Woischke, 1993). Three miles northeast of the station, at the U. S. Highway 40 bridge over Salt Creek, the Hellbender salamander, a State endangered species, has been recorded. Two and a half miles southeast of the station, on County Route 192, there is a record for the State Champion Big White Oak tree. There are also numerous fish and mollusk records for the Muskingum River from Zanesville downstream about 15 miles. Specifically, two State endangered fish, the Northern Madtom and the Mountain Madtom, and two threatened mollusks, the Fawnsfoot and the Threehorn Wartyback, have been found in this area of the Muskingum River. There are no nature preserves, parks, scenic rivers, or other critical habitat areas within a 4-mile radius of the Zanesville ANGS.

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SECTION 4.0 SITE EVALUATION

4.1 ACTIVITY REVIEW

4.1.1 Preliminary Assessment Interviews

During the PA at Zanesville ANGS, interviews were completed with 13 station personnel, including the Station Commander. The average tenure of these personnel at Zanesville ANGS is 20 years; five of these personnel have been associated with the station for 25 years or more. The major operation of the station which has involved the use and disposal of hazardous materials is the maintenance of vehicles. Hazardous materials such as oils, solvents, battery acids, paint thinners, and fuels are the primary materials used and disposed in vehicle maintenance operations. Therefore, interview topics were focused primarily in the area of vehicle maintenance operations.

The interview process revealed the following locations at the station which may be of concern regarding hazardous materials (see Figure 2.2).

- Two abandoned underground storage tanks (USTs) which held fuel oil for boilers. One UST (3,000 gal) is located at the northeast corner of Building 1 and the second UST (1,000 gal) is located at the southwest corner of Building 5. Both USTs are scheduled for removal within the next year.

- A water well located north of the east wing of Building 1, which served as the station's sole source of water from 1952 to 1974. The well is currently covered but has not been abandoned. Zanesville ANGS, RANGB, and the Division of Water, ODNR are unable to provide information, such as well depth, screening interval, or depth to water, for this well.

- Two septic tank and leach field systems were formerly located at the station. The first was located north of Building 1 and served that building, and the second was located west of Building 5 and served Buildings 3 and 5. The first septic system was put in with the original construction of Building 1 in 1952, and the second septic system was put in with construction of Building 5 in 1979. Besides sanitary sewage, the second septic system accepted waste from industrial drains in Building 5, after passage through an oil/water separator. Both septic systems

were removed in the summer of 1994 when the station was connected to the Muskingum County sewerage system.

- Old motor vehicle maintenance area at the north end of the west wing of Building 1, used for this purpose up to 1979. No floor drains existed in this area. Directly outside this building on its west side is where hazardous wastes were stored from 1970 to 1992. Oil, antifreeze, and solvent wastes were collected in drums which were stored on a horizontal rack approximately 18 inches off the ground. At the time drums were stored here, the area was (and is presently) covered with grass.

- Current motor vehicle maintenance in Building 5, including drains leading to the oil/water separator and a battery neutralization pit which has never been used for that purpose.

- Station fueling area at the southwest corner of Building 5. The area consists of a fuel island, a 550-gal aboveground storage tank (AST) used to store diesel and a 4,000-gal UST used to store motor vehicle gasoline (MOGAS). This UST is also scheduled for removal within the next year.

- An area (approximately 40 feet by 40 feet) located in the training field on the west side of the station where the ground is continually saturated with water. This area is directly downhill and west of Building 5. The source of the water is unknown, but is suspected to be one or the other of the two station leach fields.

The interview process also revealed the following practices involving hazardous materials or wastes which occurred at various times at the station:

- From approximately 1979 to 1991, vehicle-related liquids, such as waste oil and fuel, antifreeze and solvents, were accumulated and stored in drums on the rack at the west end of Building 1 before being sent to RANGB or to a civilian contractor for disposal. Presently, these drums are stored in an EPA-approved and enclosed storage shed at the north end of Building 5.

- The off-pavement area east and northeast of Building 5 has been used since 1978 for several vehicle-related activities, including washing and degreasing of vehicles, painting of vehicles and equipment (painting of entire vehicles is not

performed at Zanesville ANGS), and only in several instances, disposal of battery acid by dumping (without neutralization) onto limestone gravel.

- Vehicle battery acid was also disposed of during a five-year period in the 1970s by dumping without neutralization onto limestone gravel in a small area on the west side of the asphalt drive northwest of Building 1. The acid from approximately ten batteries was disposed in this manner per year.

- Fire training exercises with a simulated fuel fire (approximately 1 gal of kerosene or MOGAS) occurred twice at the station. In both instances, a drip pan was used to hold the fuel and prevent any contact with the ground.

- Small amounts of isopropyl alcohol, trichloroethylene, and toluene were used for electronic parts cleaning; all of the material evaporated in the process.

4.1.2 Preliminary Assessment Records Search

As part of the PA at Zanesville ANGS, some station records were obtained. These records provided more detailed or corroborating information about the station in general, and about some of the potential areas of concern. The following records were obtained:

- A station map showing the boundary of the leased area, buildings, all underground utilities, and the two septic tank and leach field systems.

- An as-built drawing for Building 5 showing the detailed location of the fuel oil UST, the fuel island and the MOGAS UST, the oil/water separator, and the septic system associated with Building 5.

- A station map showing the location of sewer lines for a proposed installation and hookup to the Muskingum County sewerage system.

- A current list, compiled by Zanesville ANGS, of all hazardous materials used or stored at Zanesville ANGS.

4.1.3 Hazardous Materials Inventory

Since the inception of the station, waste oils, fuel, solvents, and antifreeze have been stored in separate drums. Since the 1970s, these waste materials have been transported to RANGB for disposal. The historical disposition of all waste materials is shown in Table 4.1.

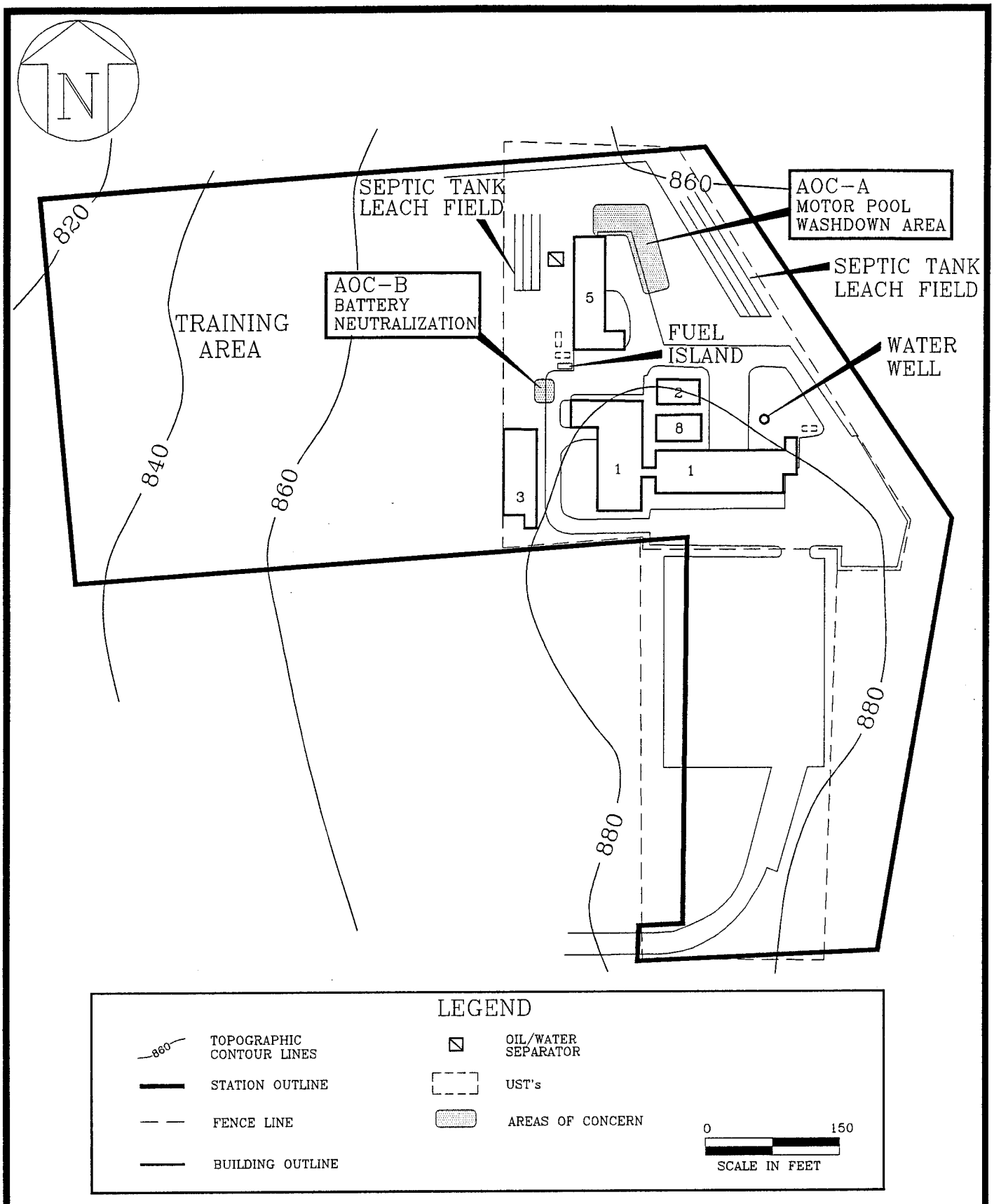
Table 4.1
Inventory of Hazardous Materials Used at Zanesville ANGS
220th EIS, Zanesville ANGS, Zanesville, Ohio

Possible Waste Materials	Quantities/Disposed Gallons/year	Methods of Treatment, Storage, and Disposal in Chronological Order			
		1960s	1970s	1980s	Present
Engine Oil	165 gal/yr	UNK	RANGB	RANGB	DRMO
PD-680	None	UNK	RANGB	RANGB	Not Used
Sulfuric Acid	None	UNK	NEUT GRD	RANGB/CIV	CIV
Ethylene Glycol	55 gal/yr	UNK	RANGB	RANGB	DRMO
Hydraulic Oil	5 gal/yr	UNK	RANGB	RANGB	DRMO
Transmission Fluid	4 gal/yr	UNK	RANGB	RANGB	DRMO
Paint Thinner	30 gal/yr	UNK	RANGB	RANGB	CIV/UIP
Brake Fluid	2 gal/yr	UNK	RANGB	RANGB	DRMO
Diesel Fuel	2,000 gal/yr	UNK	UIP	UIP	UIP
Parts Cleaner	396 gal/yr	UNK	RANGB	RANGB	CIV
Paint	32 gal/yr	UNK	RANGB	RANGB	CIV/UIP
Solid Waste Oil Filters	50/yr	UNK	COUNTY	COUNTY	COUNTY
MOGAS	10,000 gal/yr	UIP	UIP	UIP	UIP

gal/yr – gallons per year.
CIV – Civilian Contractor (Safety Kleen).
UIP – Used in Process.
RANGB – Transported to Rickenbacker ANGB for disposal.
DRMO – directly to the Defense Reutilization and Marketing Office.
NEUT GRD – Neutralized by disposing directly on the ground.
UNK – Unknown.
COUNTY – Discarded in a Dumpster.

4.2 DISPOSAL/SPILL AREA OF CONCERN IDENTIFICATION

Interviews with station personnel and a station tour resulted in the identification of two areas potentially contaminated with hazardous materials or hazardous wastes. These two areas are characterized in detail below, and their locations are depicted in Figure 4.1.



SOURCE: 220th EIS MAP, 1993.

FIGURE 4.1 P\ZANES\INBACK	STATION AREAS OF CONCERN 220th EIS, Zanesville ANGS Zanesville, Ohio	OPTECH OPERATIONAL TECHNOLOGIES CORPORATION NOVEMBER 1994

4.2.1 Motor Pool Washdown AOC (AOC-A)

4.2.1.1 Background and Operational History

The Motor Pool Washdown AOC (AOC-A) is located northeast of Building 5 (see Figure 4.1). AOC-A borders the outside edge of the asphalt in front of the vehicle maintenance bays of Building 5, and is L-shaped. The area is covered by gravel and small amounts of grass, and a shallow open drainage channel drains surface runoff across AOC-A in a northerly direction, from the pavement to the grass-covered area north of this AOC. Approximately five to seven ANG trucks, trailers, tractors, and other heavy equipment vehicles are parked in this area at any one time.

This area has been used since 1978 as a washrack and degreasing area. Commercial soap products have been used for washing; this activity occurs frequently. Engine degreasing, performed only prior to 1986, involved the use of Stoddard solvent and a commercial degreasing agent 'Gunk.' There are no water catchment structures or drains in the area, and so all washing activities result in wash water disposal directly on the ground. Touch-up painting of station equipment and vehicles, though not entire vehicle painting, also occurs in this area at a frequency of once per month or less. Paint thinners (approximately 1 quart per event) are used during this activity, and there are remnants of this painting activity on the ground. There were also reported instances of disposal of battery acid by dumping onto the limestone gravel during the 1970s at AOC-A.

4.2.1.2 Review of Existing Sampling Data

No previous sampling data exists for AOC-A.

4.2.2 Battery Neutralization AOC (AOC-B)

4.2.2.1 Background and Operational History

The Battery Neutralization AOC (AOC-B) is located just off the west edge of the pavement northwest of Building 1 and southwest of Building 5 (see Figure 4.1). The area is completely covered with gravel.

During a period of approximately five years in the 1970s up to 1979, acid from vehicle batteries (containing sulfuric acid and lead) was disposed of by direct dumping, without neutralization,

onto the gravel at this location. This disposal activity occurred at a rate of approximately ten batteries per year. The area does not show any remaining signs, such as gravel discoloration, attributable to this activity. The area was likely disturbed in 1991 when water and sewer lines running from Building 5 to Building 3 were installed underground within 5 to 10 feet of this area.

4.2.2.2 Review of Existing Sampling Data

No previous sampling data exists for AOC-B.

4.3 OTHER PERTINENT FINDINGS

There is one oil/water separator at the station, as shown in Figure 4.1. The separator is located west of Building 5. The influent to the separator comes from non-sanitary drains in Building 5, while its effluent feeds into the second septic system west of Building 5. The separator is checked monthly for appropriate overflow. It has been pumped out twice in the last 15 years, with the sludge collected by a local contractor for disposal.

Vehicles at the station have always been refueled at the existing fuel island. Since the inception of the station, fuels (diesel and MOGAS) were stored in ASTs, until the current MOGAS UST was installed in 1970. This UST has recently been leak tested and passed.

4.4 CONCLUSIONS

The information obtained from the interviews and records search indicated that there were two potential AOCs at Zanesville ANGS, namely the Motor Pool Washdown AOC (AOC-A) and the Battery Neutralization AOC (AOC-B). Each of these areas was selected due to past practices involving use or disposal of hazardous materials which could affect soil or groundwater at these locations.

4.5 RECOMMENDATIONS

As a result of the PA activities performed at Zanesville ANGS, Site Inspection field activities were recommended at the two AOCs identified. The purpose of these activities was to confirm the presence of suspected contamination in soils at these AOCs.

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SECTION 5.0 FIELD PROGRAM

The purpose of the SI was to confirm the presence or absence of contamination at the Motor Pool Washdown and Battery Neutralization AOCs identified in the PA at Zanesville ANGS, and to provide data to reach a decision point for each AOC. This section describes the field activities performed during the Site Inspection to accomplish these objectives, and the methodologies used to conduct these activities. The Site Inspection at Zanesville ANGS commenced on 1 June 1994 and was completed on 3 June 1994.

5.1 GENERAL APPROACH

The suspected mode of contamination at the two AOCs described in Section 4.2 is by spillage or intentional application to the ground surface, rather than by any pipe or tank leakage processes occurring underground. Therefore, soil borings were the Site Inspection method.

The Inventory of Ohio Soils: Muskingum County states that the depth to bedrock for the soil association at the Zanesville ANGS varies between approximately 4 and 7 feet BLS (see Table 3.1). Well logs for four domestic water wells within a one-mile radius state that bedrock is encountered at between 5 and 15 feet BLS (see Table 3.2), and also that groundwater is typically encountered below this overburden/bedrock interface. Therefore, soil borings were planned for a depth of 12 feet BLS at each AOC, except for one boring per AOC, which was to be drilled until either groundwater or bedrock (maximum depth of 15 feet BLS) was encountered (deep boring). Two soil samples were to be collected and submitted for laboratory analysis per boring.

5.2 FIELD SCREENING ACTIVITIES

Screening of soil samples obtained during drilling activities was performed during the field investigation at Zanesville ANGS to provide immediate information as to the environment of the boreholes, and to aid in the selection of soil samples to be submitted for laboratory analysis.

During sampling of soil borings, the air around the sampler was monitored with a HNu DL-101 Data Logging PID immediately upon opening the sampler (to maximize the detection of volatiles). The soil samples collected were placed in plastic bags, and the HNu DL-101 PID was used to conduct ambient temperature headspace analysis (ATHA) for photoionization compounds. All PID readings are indicated on the boring logs included in Appendix B. Soil samples were also field screened using a Photovac 10S+ Portable GC. The field GC, calibrated

for benzene, toluene, ethylbenzene, and xylenes (BTEX), was used to detect the presence of these compounds in the headspace from the soil samples collected. Headspace analysis was used to provide immediate information as to the environment of the borehole. Data obtained from the field GC and PID supplements analytical laboratory data. Field GC data is summarized in Subsections 6.3.1 and 6.4.1, Field Screening Results. All field GC screening results are presented in Appendix C.

5.3 CONFIRMATION ACTIVITIES

Jones Environmental Drilling, Inc., of Versailles, Indiana, was retained as the drilling contractor for all hollow-stem auger (HSA) activities. The selected drilling contractor mobilized personnel and equipment that met or exceeded Ohio ANG and/or Ohio Environmental Protection Agency (OEPA) requirements.

Southern Petroleum Laboratories of Houston, Texas, was retained to perform laboratory analyses. Provisions were made for proper sample containers, labels, chain-of-custody forms, sample stabilization and preservation, and packing materials by the selected laboratory.

Linn Engineering, Inc., of Zanesville, Ohio, was retained as the surveying contractor. Buildings adjacent to each AOC and soil boring locations at each AOC were surveyed. The land surface elevation of each borehole is shown on the soil boring logs in Appendix B.

5.3.1 Soil Borings

Soil borings were drilled to obtain soil samples for laboratory analysis for confirming the presence or absence of subsurface soil contamination. Soil samples were also used for determining site geology and subsurface soil characteristics.

A total of ten soil borings were drilled by HSA techniques for data collection. All work was performed in a manner consistent with OEPA requirements. All soil borings were drilled to 11.5 feet BLS except for one boring at each AOC, which was drilled to bedrock. Bedrock was identified by auger refusal. At AOC-A, bedrock was encountered at 14.2 feet BLS, while at AOC-B, it was encountered at 15.5 feet BLS. All soil boring locations and elevations were determined by the surveyor contracted for Zanesville ANGS field work.

Soil borings were drilled by using HSA methods at both AOC-A and AOC-B. The HSA drilling method employs a hollow helical steel drill tool that is rotated to advance the boring and lift

formation materials (cuttings) to the surface. The flights for the HSA are welded onto steel pipe and a cutter head is attached to the "lead" (bottom) auger to cut the hole. During drilling, a center bit is inserted into the hollow area of the cutter head that prevents cuttings from re-entering the hollow portion of the auger. Generally, the center bit is flush with or extends no more than 1/2 foot below the cutter head. The center bit connects through the auger flights by small diameter drill rods and is attached to the top-head drive unit of the drill rig. The top-head drive is powered by a truck-mounted engine that mechanically rotates the entire flight of augers. The hollow opening allows the insertion of sampling tools (i.e., split-spoon sampler) with the augers in place to prevent caving of the borehole.

Soil samples were collected below the surface and above the bedrock for subsurface characterization and field screening. An 18-inch carbon steel California-style sampler equipped with three 6-inch brass sleeves was used for collecting soil samples for laboratory analysis. Actual sample depths submitted for laboratory analysis are discussed in Subsections 6.3.2 and 6.4.2, and shown on the soil boring logs included in Appendix B. The California-style sampler was decontaminated and new brass sleeves inserted before each sampling event.

Auger flights, drill rig(s), and tools were thoroughly steam-cleaned in the designated decontamination area (located directly east of the north end of Building 5) before initial use and after the completion of each borehole.

Borehole abandonment activities conformed to applicable State of Ohio requirements. All hand auger and HSA borings were backfilled with pure bentonite grout after sampling was accomplished to prevent the downward migration of contaminants through the open borehole.

5.3.2 Piezometers

The installation of four piezometers was described as an optional activity in the Work Plan. These piezometers were to be installed only if groundwater was encountered in any of the soil borings. During the field work, no groundwater was encountered in any of the borings, and therefore, no piezometers were installed during SI field work at Zanesville ANGS.

5.3.3 Specific Media Sampling

This subsection summarizes the analytical program followed for soil samples collected during the Site Inspection to determine the presence or absence of contamination at two AOCs.

Past activities at AOC-A indicate that the suspected contamination consists primarily of waste oil, solvents, and neutralized battery acid. Therefore, the analytical program for AOC-A focused on the detection of volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), priority pollutant metals, and total petroleum hydrocarbons (TPH).

Past activities at AOC-B indicate that the suspected contamination consists exclusively of neutralized battery acid. Therefore, the analytical program for AOC-B focussed on the detection of lead.

To comply with OEPA requirements, and to fulfill the requirements of the PA/SI, soil samples for AOC-A were analyzed for VOCs using Method SW8240; SVOCs using Method SW8270; priority pollutant metals by SW6010 and SW7000 series Methods, and TPH by California Modified Method 8015. Soil samples for AOC-B were analyzed for lead by Method SW7421. Table 5.1 summarizes the analytical program for all ten soil boring locations.

Table 5.1
Laboratory Analytical Program and Confirmation Activities Table
220th EIS, Zanesville ANGS, Zanesville, Ohio

AOC	Matrix	Field Parameters	Lab Parameters	U. S. EPA Methods	Investigative Samples
A	Soil (Subsurface)	Field Screening using PID, Field GC, Soil Classification	VOCs SVOCs Metals TPH	SW8240 SW8270 SW6010[a] Ca. Mod. 8015	14
B	Soil (Subsurface)	Field Screening using Soil Classification	Lead	SW7421	6

[a]All metals analyzed by SW6010 except: Arsenic – SW7060; Cadmium – SW7131; Chromium – SW7196; Lead – SW7421; Mercury – SW7470; Selenium – SW7740; and Thallium – SW7841.
SVOC – Semivolatile Organic Compounds.
VOC – Volatile Organic Compounds.
TPH – Total Petroleum Hydrocarbons.
Ca. Mod. – California Modified.

5.3.3.1 Soil Sample Preservation

All soil samples submitted for laboratory analysis collected with a California-style split-spoon sampler were contained in brass sleeves. Immediately upon removal from the sampler, the sleeve ends were covered with a teflon barrier, aluminum foil, and fitted with a plastic cap. The sleeves were properly labeled, placed in plastic bags, stored in coolers, and chilled to 4° C or less.

5.4 AOC-SPECIFIC INSPECTION PROGRAM

5.4.1 Motor Pool Washdown AOC (AOC-A)

AOC-A is located northeast of Building 5, bordering the pavement east of that building (see Figure 5.1). The AOC is L-shaped and is approximately 30 feet wide and 100 feet long. The eastern portion of the AOC is primarily covered with gravel while the northern portion of the AOC is covered with grass and gravel. An underground electrical line runs north-south through the northern portion of the AOC.

Vehicles are washed and degreased, and equipment is painted in this area. Battery acid has also been disposed of in the past by direct dumping onto the gravel in this area. Soil borings were used to confirm or deny contamination and to characterize the subsurface geology and soil conditions at this AOC.

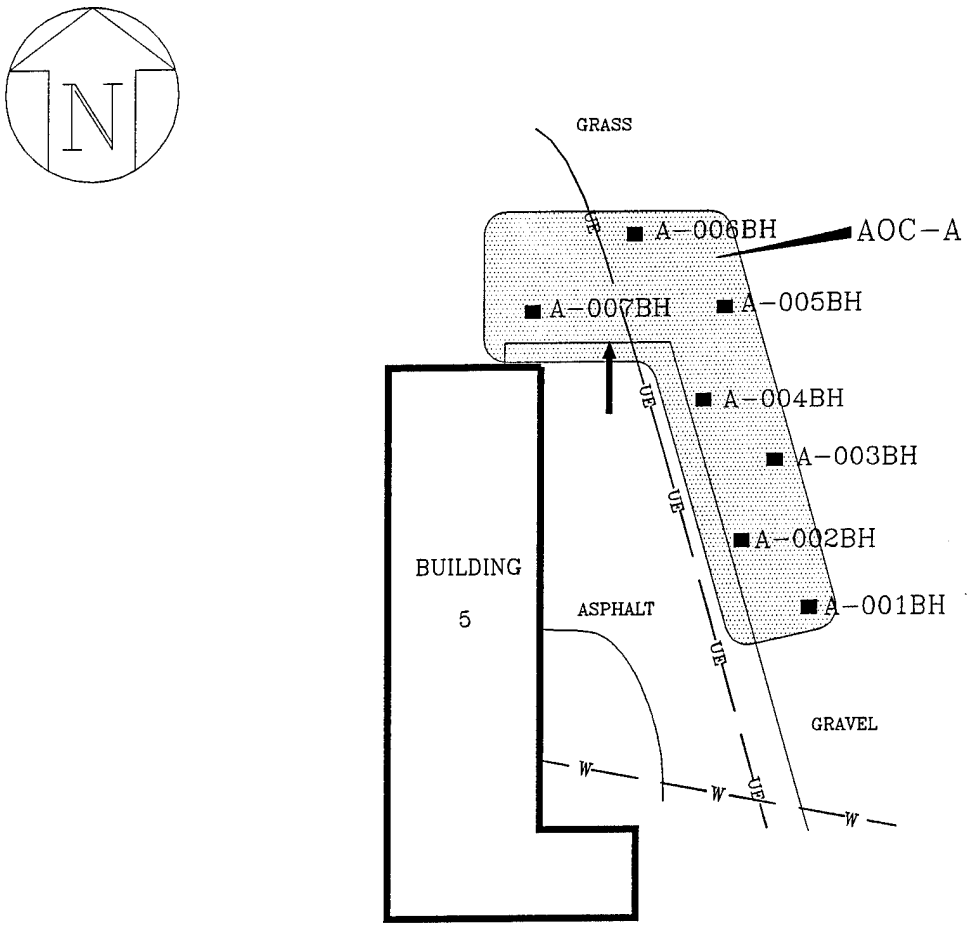
5.4.1.1 Soil Borings

The soil boring locations for AOC-A are shown on Figure 5.1. Seven soil borings were drilled at the locations originally proposed in the Work Plan at this AOC. Soil borings A-001BH through A-005BH were drilled in the gravel-covered eastern portion of the AOC to determine if contamination is present where vehicles are regularly parked and washing/degreasing operations occur. Soil borings A-006BH and A-007BH were drilled in the grassy northern portion of the AOC to determine if contamination is present due to painting activities in this area and surface runoff which flows across this area. Boring A-004BH was drilled until bedrock was encountered at this AOC.

5.4.2 Battery Neutralization AOC (AOC-B)

AOC-B is located just west of the pavement northwest of Building 1 (see Figure 5.2). The AOC is approximately 20 feet by 20 feet and is completely covered by gravel. Underground sewer and water lines run north-south at the western edge of this AOC.

During the 1970s, battery acid was disposed of by directly discharging onto the gravel at this area. Soil borings were used to confirm or deny contamination and to characterize subsurface geology and soil conditions at this AOC.



LEGEND

- SURFACE RUNOFF
- AREAS OF CONCERN
- ASPHALT OUTLINE
- —UE— UNDERGROUND ELECTRIC LINE
- —W— WATER LINE
- BUILDING OUTLINE
- SOIL BORING

0 40

SCALE IN FEET

SOURCE: 220th EIS MAP, 1993.

FIGURE 5.1

P\ZANES\AOC-A

SAMPLING LOCATIONS FOR AOC-A
220th EIS, Zanesville ANGS
Zanesville, Ohio

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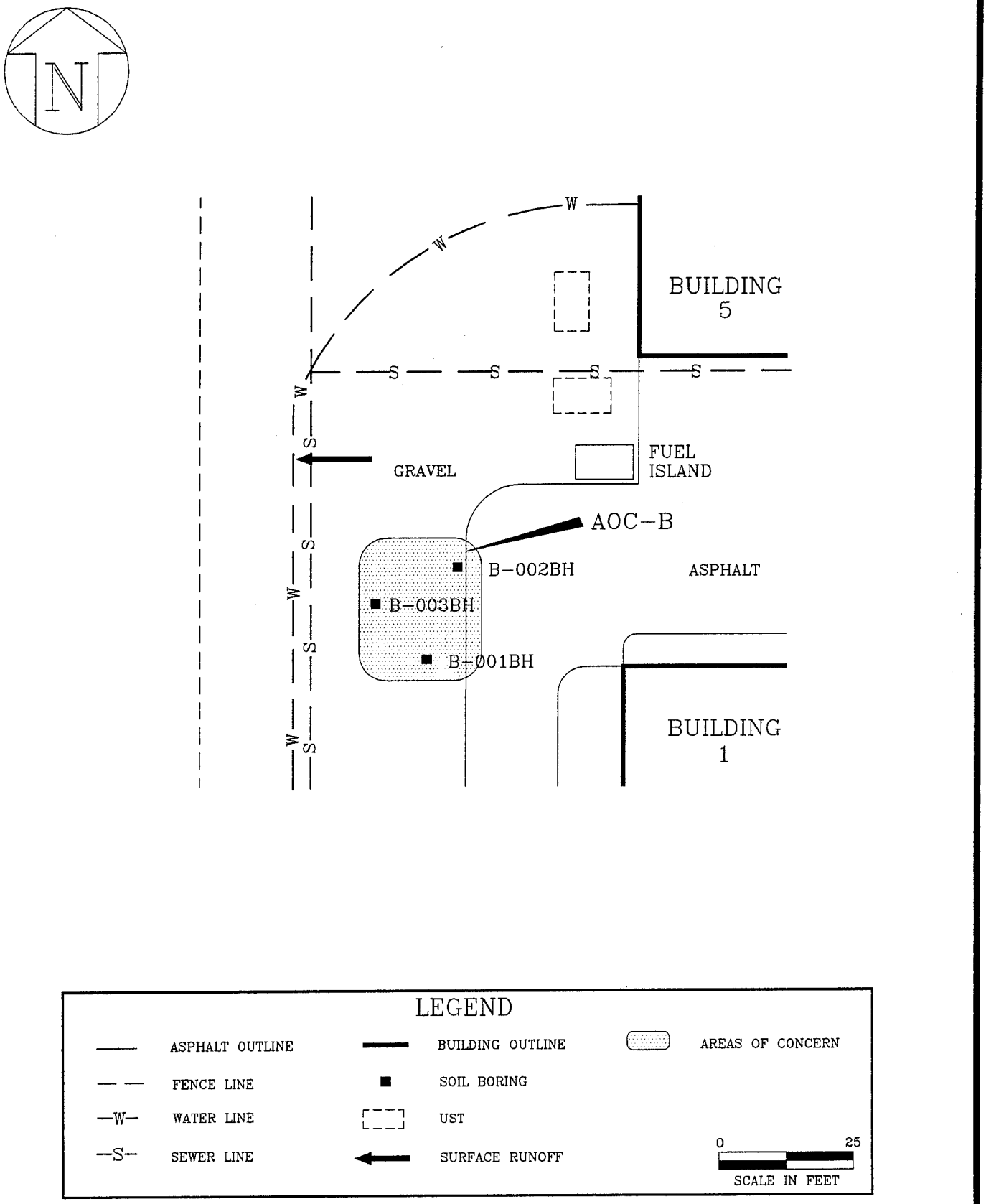


SOURCE: 220th EIS MAP, 1993.

FIGURE 5.2 P\ZANES\B-SAMPLG	SAMPLING LOCATIONS FOR AOC–B 220th EIS, Zanesville ANGS Zanesville, Ohio	O P T E C H OPERATIONAL TECHNOLOGIES C O R P O R A T I O N JULY 1994

5.4.2.1 Soil Borings

The soil boring locations for AOC-B are shown on Figure 5.2. Three soil borings were drilled at this AOC. The locations of soil borings B-001BH, B-002BH, and B-003BH are in the small area where battery acid was reportedly dumped. Boring B-003BH was drilled until bedrock was encountered at this AOC.

5.5 SITE INSPECTION DERIVED WASTE

During the SI, a certain amount of waste material (drill cuttings and decontamination water) were produced as a result of investigation activities. Soil cuttings from drilling locations and all decontamination water were drummed in steel, 55-gallon Department of Transportation (DOT) drums. A total of nine drums were produced; eight containing soil cuttings and one containing decontamination water. There were no miscellaneous derived wastes (personal protective equipment (PPE) and visqueen sheeting) which came in contact with soils having PID readings in excess of 100 parts per million (ppm), therefore, all PPE was discarded in a general refuse container at the conclusion of field work. All drums were properly marked to indicate their contents, including the collection date, contractor's name and phone number, and borehole ID number or decontamination water.

Guidance for final disposition of drummed materials is provided in the following subsections. Detailed information on the highest concentrations of analytes in each drum of soil cuttings, along with guidance from OEPA on disposal of investigation derived waste, is given in Appendix D. This information has been provided to the Environmental Coordinator for Zanesville ANGS.

5.5.1 Drums Containing Soil

A total of eight drums containing soil cuttings were produced during the SI. Table 5.2 lists the drilling locations for which drums have been marked "Soil," the recommended disposition of those drums, and the rationale for each recommendation.

5.5.2 Drums Containing Non-Potable Water

Decontamination water was drummed separately. Table 5.2 includes the one drum marked "Decontamination Water," the recommended disposition of the drum, and the rationale for this recommendation. OEPA has suggested that, since the amount of decontamination water

Table 5.2
Recommended Disposition of Inspection Derived Waste
220th EIS, Zanesville ANGS, Zanesville, Ohio

Drum Number/ Material	Origin	Recommended Disposition	Rationale
1/Soil	B-001BH B-002BH	Dispose in solid waste landfill.	Soil analysis results did not exceed State action levels or PRGs.
2/Soil	B-002BH B-003BH	Dispose in solid waste landfill.	Soil analysis results did not exceed State action levels or PRGs.
3/Soil	A-001BH A-002BH	Dispose in solid waste landfill.	Soil analysis results did not exceed State action levels ore PRGs.
4/Soil	A-007BH	Dispose in solid waste landfill.	Soil analysis results did not exceed State action levels or PRGs.
5/Soil	A-006BH	Dispose as a hazardous waste.	Soil analysis results show benzo(a)pyrene exceeds State PRGs.
6/Soil	A-004BH	Dispose in solid waste landfill permitted to accept TPH-contaminated soils.	Soil analysis results show TPH exceeds State action levels.
7/Soil	A-002BH A-003BH	Dispose in solid waste landfill.	Soil analysis results did not exceed State action levels or PRGs.
8/Soil	A-005BH	Dispose in solid waste landfill permitted to accept TPH-contaminated soils.	Soil analysis results show TPH exceeds State action levels.
9/Water	Decontamination Wastewater	Obtain approval from Muskingum County Sewer Service for disposal through oil/water separator at Zanesville ANGS.	Analytes washed from sampling equipment are significantly diluted by the total volume of decontamination water.

BH – Borehole.
PRG – Preliminary Remediation Goal.
TPH – Total Petroleum Hydrocarbons.

generated is small (less than 40 gallons), the Muskingum County Sewer Service may allow disposal without sampling directly into the sanitary sewer.

5.6 DEVIATIONS FROM THE WORK PLAN

There were deviations from the Work Plan. However, in no way did any of the changed procedures or protocols prevent accomplishing the overall objectives of this Site Inspection which were: to confirm the presence or absence of contamination; and to reach a decision point for each AOC.

The deviations from the Work Plan and the rationale for the changes are described as follows:

- Duct tape was not used to secure plastic caps to brass sleeves containing soil samples sent for laboratory analysis (Subsection 7.5.1 of the Work Plan). The adhesive in duct tape is a possible source of toluene, and thus, may lead to false positive identification in VOC analyses.

- Only some soil samples were field screened with the PID during drilling. The PID became inoperable during the first day of drilling and was not able to be fixed in the field. Monitoring of the breathing zone was performed with a combustible gas indicator (Industrial Scientific MX251 LEL-Oxygen Monitor) in place of the PID. The field GC screening results served as the basis for selection of soil samples for laboratory analysis.

- Bentonite pellets were used to grout boreholes instead of a cement/bentonite slurry mixture, as approved by the State of Ohio. Pure bentonite pellets were placed in the borehole and hydrated with potable water.

SECTION 6.0 SITE INSPECTION RESULTS

6.1 STATION SUBSURFACE GEOLOGY

Soil samples collected from soil borings were used to provide information to describe the subsurface geology and soil conditions at the station. The two AOCs are in close proximity to one another and there is no apparent variation in land surface type between them. The soil survey for Muskingum County indicates that only one soil type, the Wellston-Zanesville-Alford association, is present at the station. Complete lithologic logs for the soil borings drilled during this investigation are presented in Appendix B.

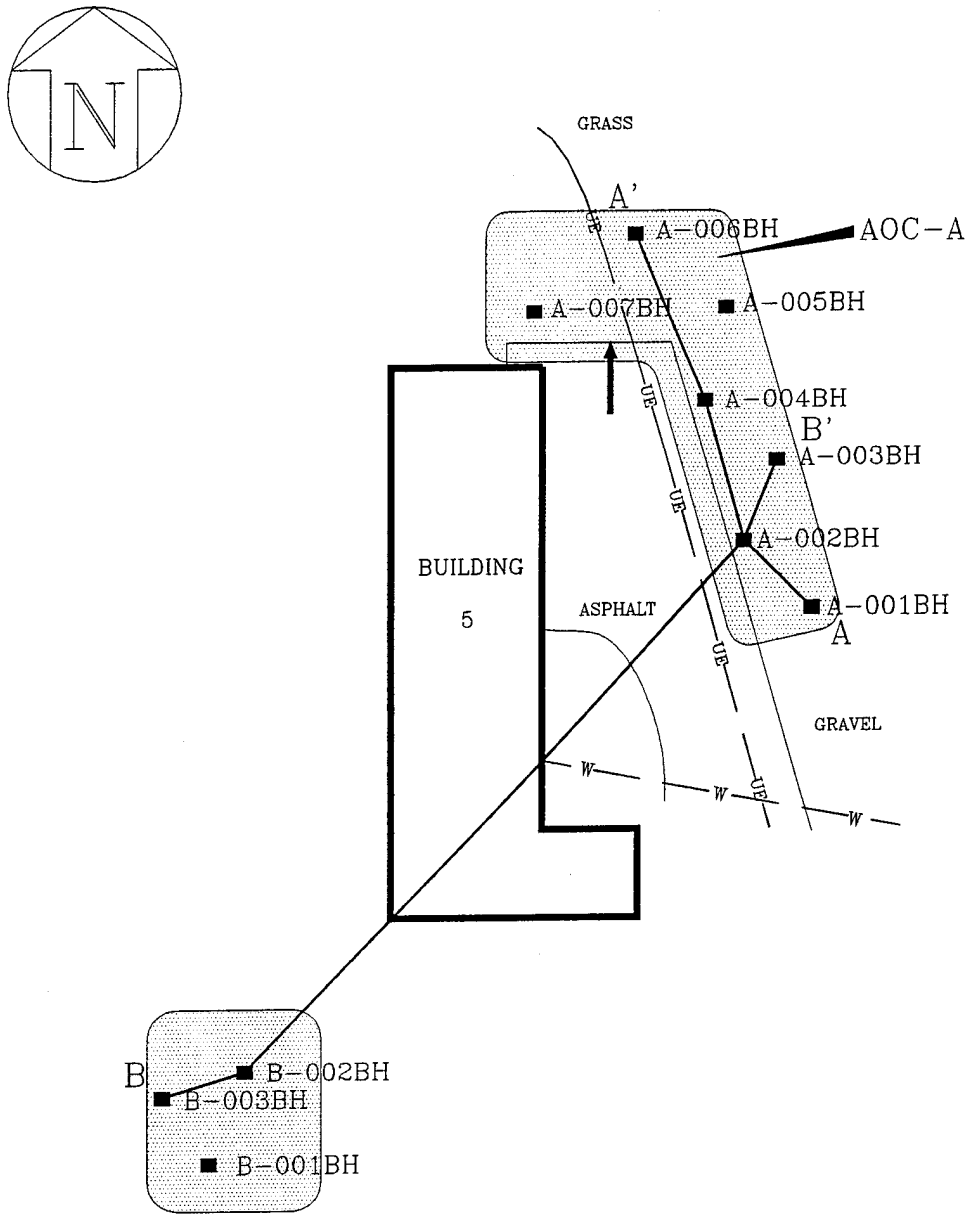
The soils encountered at the two AOCs at Zanesville ANGS are primarily a sandy or silty clay loam, with an underlying light brown to tan sand encountered at 10 to 11.5 feet BLS. Eight of ten soil borings were drilled to 11.5 feet BLS at the two AOCs. One boring at each AOC was drilled to where the sandstone bedrock was encountered. Bedrock, determined by auger refusal, was present in these borings at 14.2 feet BLS at AOC-A and at 15.5 feet BLS at AOC-B. Cross sections depicting the subsurface geology are indexed in Figure 6.1 and shown in Figures 6.2 and 6.3.

6.2 LABORATORY QUALITY ASSURANCE RESULTS FOR CONFIRMATION SAMPLES

VOC surrogate recoveries ranged from 86% to 112% for bromofluorobenzene, from 98% to 118% for toluene-d_8, and from 92% to 104% for 1,2-dichloroethane-d_4. These recoveries were all within the required quality control limits for each of the three surrogates.

SVOC surrogate recoveries for acid compounds ranged from 57% to 80% for 2-fluorophenol, from 63% to 77% for phenol-d_6, and from 10% to 87% for 2,4,6-tribromophenol. SVOC surrogate recoveries for base-neutral compounds ranged from 65% to 80% for nitrobenzene-d_5, from 67% to 105% for 2-fluorobiphenyl, and from 60% to 84% for p-terphenyl-d_{14}. The quality control acceptance criteria for SVOC surrogate compounds allows for one acid and/or base-neutral compound to be outside of the specific recovery limits. This criteria was met for all 14 samples analyzed.

TPH surrogate recovery of n-pentacosane ranged from 75% to 478%. In four of the 14 samples analyzed, the surrogate recovery was higher than the specified control limits of 46% to 130%. Therefore, the actual TPH concentrations for these four samples may be less than the reported values.



LEGEND

- SURFACE RUNOFF
- AREAS OF CONCERN
- ASPHALT OUTLINE
- —UE— UNDERGROUND ELECTRIC LINE
- —W— WATER LINE
- BUILDING OUTLINE
- SOIL BORING

0 40

SCALE IN FEET

SOURCE: 220th EIS MAP, 1993.

FIGURE 6.1

P\ZANES\AOC-A

GEOLOGIC CROSS-SECTION LOCATION MAP
220th EIS, Zanesville ANGS
Zanesville, Ohio

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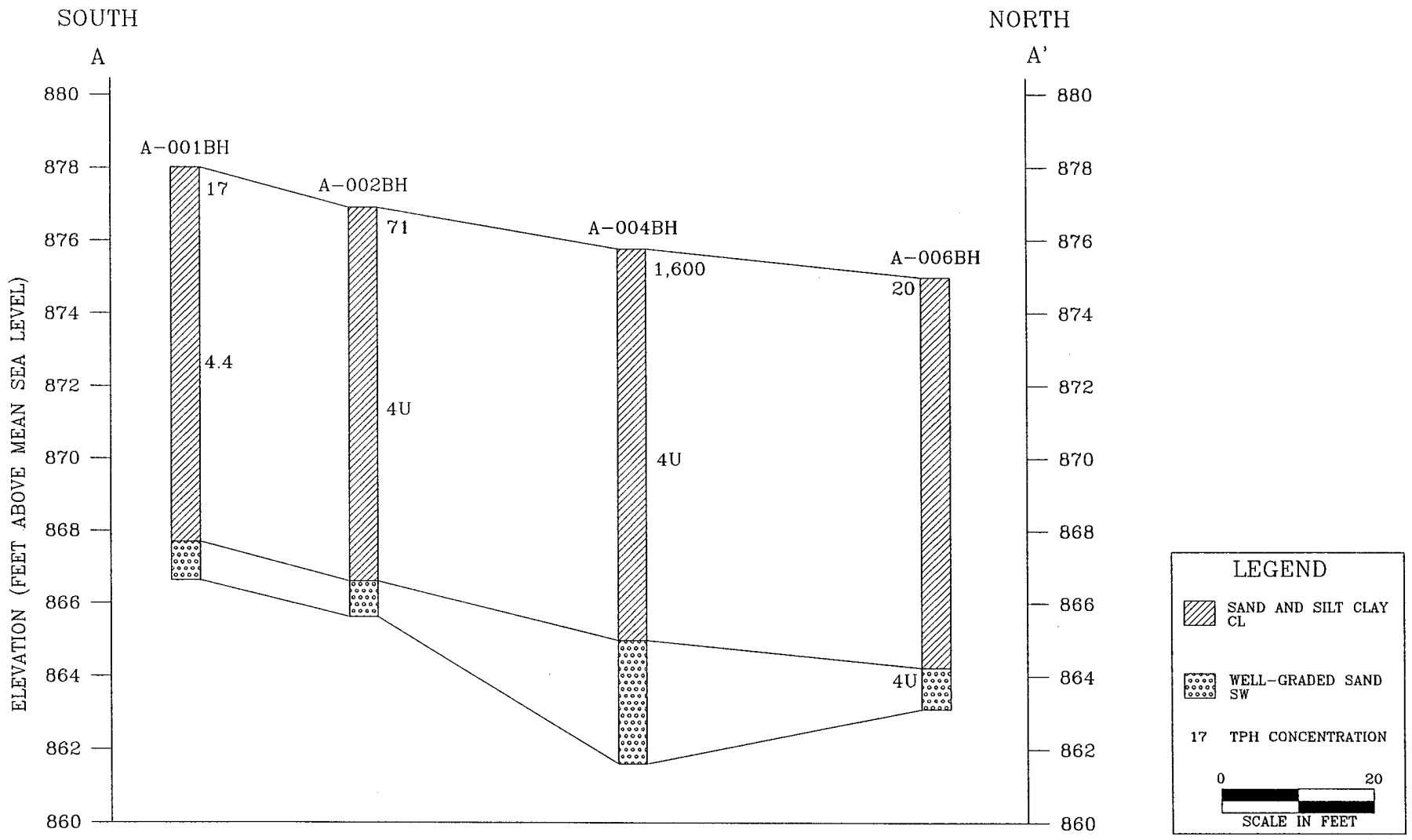

FIGURE 6.2

P\ZANES\CROSS-AA

GEOLOGIC CROSS-SECTION A-A'

220th EIS, Zanesville ANGS
Zanesville, Ohio

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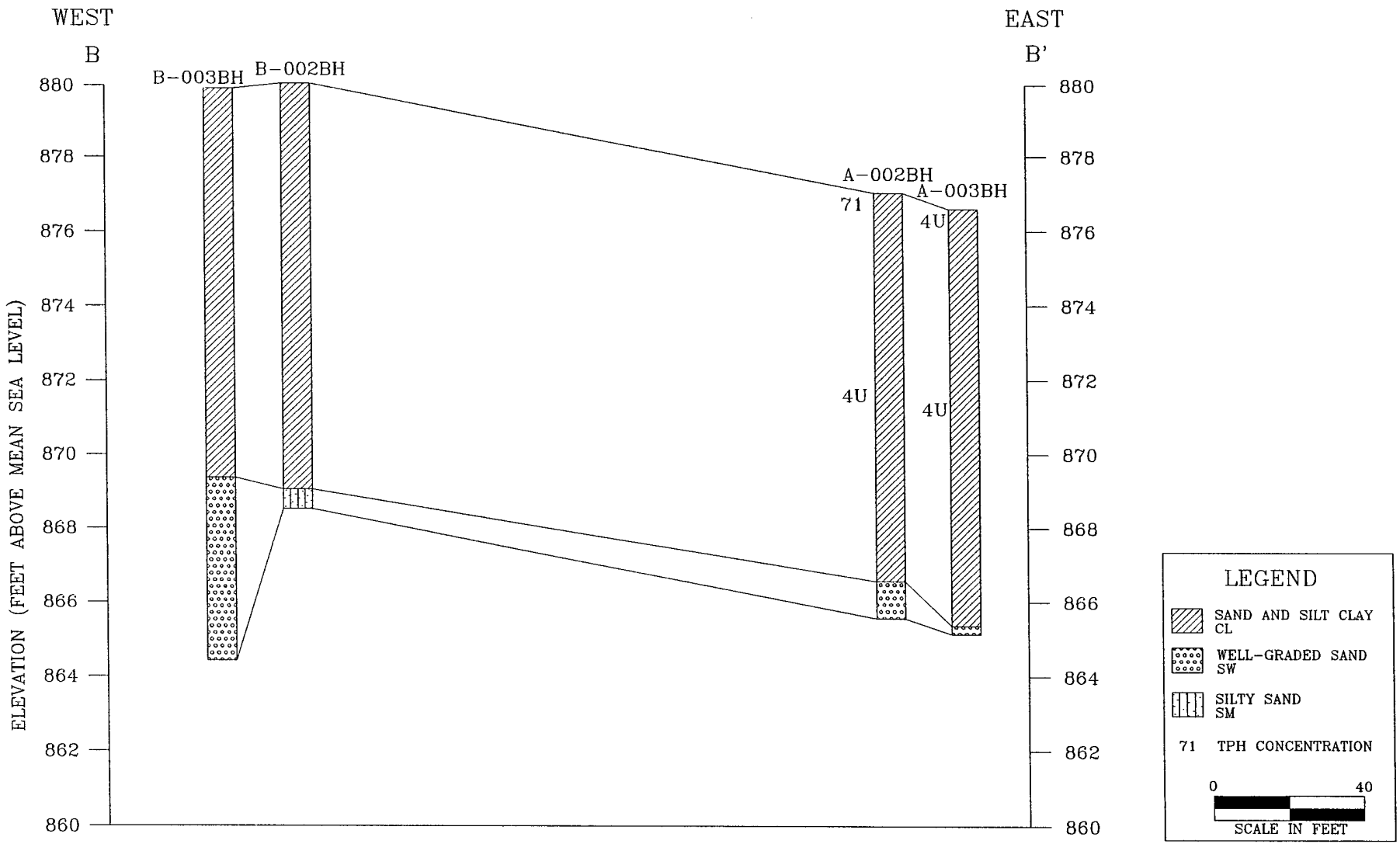

FIGURE 6.3

P\ZANES\CROSS-BB

GEOLOGIC CROSS-SECTION B-B'

220th EIS, Zanesville ANGS
Zanesville, Ohio

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6.3 MOTOR POOL WASHDOWN AOC FINDINGS

A detailed description of AOC-A, including the locations of soil borings, was given in Subsection 5.4.1.

6.3.1 Field Screening Results

Fourteen subsurface soil samples were field screened with the Photovac 10S+ Portable GC as described in Section 5.2. The GC was calibrated to screen for BTEX at 1 ppm. Complete field GC data is presented in Appendix C. No BTEX components were detected in any of the soil samples analyzed with the field GC from AOC-A.

6.3.2 Nature of Soil Contamination

Seven soil borings were drilled at AOC-A (see Figure 5.1), from which 14 investigative samples were collected for laboratory analysis. The borings were drilled and samples collected on 2 June 1994. Sampling intervals submitted for laboratory analysis and the analytical program are presented in Table 6.1. A complete listing of laboratory results for all analyses at AOC-A is given in Appendix E.

6.3.2.1 VOC Contamination

VOCs detected in soil samples collected at AOC-A are shown in Table 6.2. The VOCs acetone and tetrachloroethene (also known as perchloroethylene (PCE)) were variously detected in ten of the 14 soil samples analyzed. Acetone was detected in both soil samples collected at each of the borings A-003BH through A-007BH, at concentrations ranging from 11 micrograms per kilogram (μg/kg) to 52 μg/kg, with the highest concentration detected in sample A-004BH (5.5 - 6.5 feet BLS). In all instances of acetone detection, acetone was also detected in the associated method blank. Therefore, the actual source of acetone was laboratory contamination rather than the soil samples. Tetrachloroethene was detected at 17 μg/kg in sample A-005BH (0.5 - 1.5 feet BLS) and at 7 μg/kg in sample A-006BH (0.5 - 1.5 feet BLS).

6.3.2.2 SVOC Contamination

SVOC contamination in soil samples collected at AOC-A are shown in Table 6.3. Eight SVOCs, all polyaromatic hydrocarbons (PAHs), were detected in two of the 14 soil samples

Table 6.1
Soil Sampling and Analytical Program for AOC-A
220th EIS, Zanesville ANGS, Zanesville, Ohio

Sample Location Number	Sample Depth (ft BLS)	Soil Analyses and Methods			
		VOCs (SW8240)	SVOCs (SW8270)	Metals (SW6010[a])	TPH (Ca. Mod. 8015)
A-001BH	0.5 - 1.5	X	X	X	X
A-001BH	5.5 - 6.5	X	X	X	X
A-002BH	0.5 - 1.5	X	X	X	X
A-002BH	5.5 - 6.5	X	X	X	X
A-003BH	0.5 - 1.5	X	X	X	X
A-003BH	5.5 - 6.5	X	X	X	X
A-004BH	0.5 - 1.5	X	X	X	X
A-004BH	5.5 - 6.5	X	X	X	X
A-005BH	0.5 - 1.5	X	X	X	X
A-005BH	5.5 - 6.5	X	X	X	X
A-006BH	0.5 - 1.5	X	X	X	X
A-006BH	10.5 - 11.5	X	X	X	X
A-007BH	0.5 - 1.5	X	X	X	X
A-007BH	5.5 - 6.5	X	X	X	X

[a]All metals analyzed by SW6010 except: Arsenic – SW7060; Cadmium – SW7131; Chromium – SW7196; Lead – SW7421; Mercury – SW7470; Selenium – SW7740; and Thallium – SW7841.
AOC – Area of Concern.
ft BLS – feet Below Land Surface.
VOCs – Volatile Organic Compounds.
SVOCs – Semivolatile Organic Compounds.
TPH – Total Petroleum Hydrocarbons.
BH – Borehole.
Ca. Mod. – California Modified.

collected at AOC-A. Both of these soil samples were taken just below the surface and both were located in the grass-covered portion of this AOC.

The highest concentrations of SVOCs were detected in sample A-006BH (0.5 - 1.5 feet BLS). Benzo(a)anthracene was detected at a concentration of 2,200 µg/kg, benzo(b)fluoranthene at 1,700 µg/kg, benzo(k)fluoranthene at 1,800 µg/kg, benzo(a)pyrene at 2,100 µg/kg, chrysene at 1,800 µg/kg, fluoranthene at 4,000 µg/kg, and pyrene at 2,600 µg/kg. In sample A-005BH (0.5 - 1.5 feet BLS), fluoranthene was detected at a concentration of 2,000 µg/kg, phenanthrene at 920 µg/kg, and pyrene at 720 µg/kg. Total SVOC concentrations detected were 16,200 µg/kg and 3,640 µg/kg in samples A-006BH (0.5 - 1.5 feet BLS) and A-005BH (0.5 - 1.5 feet BLS), respectively.

Table 6.2
Volatile Organic Compounds Detected in Soil Samples at AOC-A
220th EIS, Zanesville ANGS, Zanesville, Ohio

Sample Location Number	Sample Depth (ft BLS)	Volatile Organic Compounds (µg/kg)	
		Acetone	Tetrachloroethene
A-003BH	0.5 - 1.5	34B	5U
A-003BH	5.5 - 6.5	51B	5U
A-004BH	0.5 - 1.5	46B	5U
A-004BH	5.5 - 6.5	52B	5U
A-005BH	0.5 - 1.5	24B	17
A-005BH	5.5 - 6.5	18B	5U
A-006BH	0.5 - 1.5	20B	7
A-006BH	10.5 - 11.5	20B	5U
A-007BH	0.5 - 1.5	19B	5U
A-007BH	5.5 - 6.5	11B	5U

µg/kg – micrograms per kilogram.
BH – Borehole.
ft BLS – feet Below Land Surface.
AOC – Area of Concern.
U – Compound analyzed for but not detected. Number indicates the detection limit.
B – Compound present in method blank.

Table 6.3
Semivolatile Organic Compounds (Polyaromatic Hydrocarbons) Detected in Soil Samples at AOC-A
220th EIS, Zanesville ANGS, Zanesville, Ohio

SVOC	Sample Location Number*	
	A-005BH, 0.5 - 1.5 ft BLS	A-006BH, 0.5 - 1.5 ft BLS
Benzo(a)anthracene	660U	2,200
Benzo(b)fluoranthene	660U	1,700
Benzo(k)fluoranthene	660U	1,800
Benzo(a)pyrene	660U	2,100
Chrysene	660U	1,800
Fluoranthene	2,000	4,000
Phenanthrene	920	1,600U
Pyrene	720	2,600

*All analytes reported in micrograms per kilogram (µg/kg).
BH – Borehole.
AOC – Area of Concern.
ft BLS – feet Below Land Surface.
SVOC – Semivolatile Organic Compound.
U – Compound analyzed for but not detected. Number indicates the detection limit.

6.3.2.3 TPH Contamination

TPH was detected in seven of 14 soil samples from six of the seven borings at AOC-A, as shown in Table 6.4. Six of these seven samples were from near the surface, specifically the 0.5 - 1.5 foot BLS interval. TPH was detected at concentrations ranging from 4.4 milligrams per kilogram (mg/kg) to 1,600 mg/kg. The two highest concentrations, 1,600 mg/kg and 370 mg/kg, were detected in the 0.5 - 1.5 foot BLS interval in samples A-004BH and A-005BH, respectively, while the lowest concentration was detected at a lower interval, namely 5.5 - 6.5 feet BLS in boring A-001BH. An isoconcentration map depicting the TPH levels in soil near the surface is presented in Figure 6.4.

Table 6.4
TPH Detected in Soil Samples at AOC-A
220th EIS, Zanesville ANGS, Zanesville, Ohio

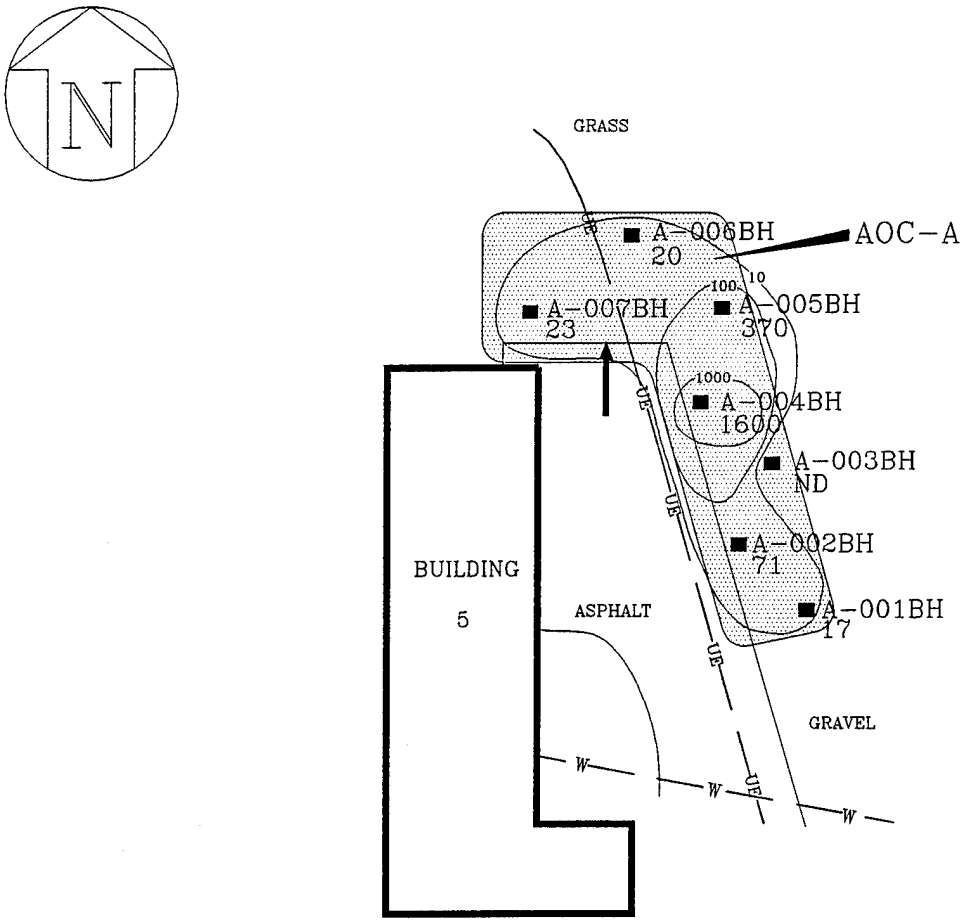
Sample Location Number	Sample Depth (ft BLS)	TPH (mg/kg)
A-001BH	0.5 - 1.5	17
A-001BH	5.5 - 6.5	4.4
A-002BH	0.5 - 1.5	71
A-004BH	0.5 - 1.5	1,600
A-005BH	0.5 - 1.5	370
A-006BH	0.5 - 1.5	20
A-007BH	0.5 - 1.5	23

AOC – Area of Concern.
BH – Borehole.
mg/kg – milligrams per kilogram.
ft BLS – feet Below Land Surface.
TPH – Total Petroleum Hydrocarbons.

6.3.2.4 Metal Contamination

Metals detected in soils collected at AOC-A are shown in Table 6.5. Ten of the 13 priority pollutant metals analyzed were detected in these soil samples. Silver, mercury, and thallium were not reported above detection limits in any of the samples.

Arsenic was detected at concentrations ranging from 2 to 16 mg/kg, with the highest concentration detected in sample A-001BH (0.5 - 1.5 feet BLS). Beryllium was detected at concentrations ranging from 0.6 to 1.2 mg/kg, with the highest concentration detected in sample A-005BH (5.5 - 6.5 feet BLS). Copper was detected at concentrations ranging from 6 to 35 mg/kg, with the highest concentration detected in sample A-003BH (5.5 - 6.5 feet BLS). Nickel



LEGEND

- SURFACE RUNOFF
- AREAS OF CONCERN
- ASPHALT OUTLINE
- 10 — TPH ISOCONCENTRATION LINE
- —UE— UNDERGROUND ELECTRIC LINE
- —W— WATER LINE
- BUILDING OUTLINE
- SOIL BORING WITH TPH CONCENTRATION (PPM)
- ND — NOT DETECTED
- 0 — 40 SCALE IN FEET

NOTE: ALL TPH CONCENTRATIONS ARE FOR SOIL AT 0.5-1.5 FT. BLS.

SOURCE: 220th EIS MAP, 1993.

FIGURE 6.4

P\ZANES\AOC-A

ISOCONCENTRATION MAP FOR TPH IN SURFACE SOILS AT AOC-A

220th EIS, Zanesville ANGS

Zanesville, Ohio

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Table 6.5
Metals Detected in Soil Samples at AOC-A
220th EIS, Zanesville ANGS, Zanesville, Ohio

Sample Location Number and Interval (ft BLS)	Metal									
	Arsenic (mg/kg)	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Nickel (mg/kg)	Lead (mg/kg)	Antimony (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)
A-001BH 0.5 - 1.5	16	0.6	1.2	7	24	14	15	3U	0.2U	57
A-001BH 5.5 - 6.5	2	0.6	0.03	7	12	4	5.7	3U	0.2U	24
A-002BH 0.5 - 1.5	2	0.8	0.17	5	25	10	10	3U	0.2U	50
A-002BH 5.5 - 6.5	0.2U	1.0	0.04	1	22	13	10	5.7	0.2U	43
A-003BH 0.5 - 1.5	4	0.8	0.04	9	28	12	9	3U	0.2U	55
A-003BH 5.5 - 6.5	12	1.0	0.04	16	35	14	10	3U	0.2U	57
A-004BH 0.5 - 1.5	9	0.6	2.6	5	27	10	16	3U	0.4	96
A-004BH 5.5 - 6.5	6	0.8	0.03	8	15	10	10	3U	0.2U	33
A-005BH 0.5 - 1.5	15	0.6	0.75	30	20	8	23	4.4	0.6	91
A-005BH 5.5 - 6.5	5U	1.2	0.02	10	13	10	9.4	3.3	0.2U	30
A-006BH 0.5 - 1.5	6	0.7	0.90	10	22	17	16	3U	0.2U	57
A-006BH 10.5 - 11.5	2	0.1U	0.01	2.3	6	1U	4.9	3U	0.2U	20
A-007BH 0.5 - 1.5	8	0.7	0.19	8	17	13	8.4	3U	0.2U	49
A-007BH 5.5 - 6.5	9	0.9	0.08	9	22	16	11	3U	0.2U	52
Background Concentrations in East-Central Ohio	10	1 - 1.5	0.32 - 0.64	100 - 2,000	30	30 - 700	30 - 700	1 - 8.8	0.3 - 0.7	45

AOC – Area of Concern.
ft BLS – feet Below Land Surface.
BH – Borehole.
mg/kg – milligrams per kilogram.
U – Compound analyzed for but not detected. Number indicates the detection limit.

was detected at concentrations ranging from 4 to 17 mg/kg, with the highest concentration detected in sample A-006BH (0.5 - 1.5 feet BLS). Antimony was detected at concentrations ranging from 3.3 to 5.7 mg/kg, with the highest concentration detected in sample A-002BH (5.5 - 6.5 feet BLS). Cadmium and zinc were detected at concentrations ranging from 0.01 to 2.6 mg/kg and 20 to 96 mg/kg, respectively, with the highest concentrations detected in sample A-004BH (0.5 - 1.5 feet BLS). Chromium, lead, and selenium were detected at concentrations ranging from 1 to 30 mg/kg, 4.9 to 23 mg/kg, and 0.4 to 0.6 mg/kg, respectively, with the highest concentrations detected in sample A-005BH (0.5 - 1.5 feet BLS).

6.4 BATTERY NEUTRALIZATION AOC FINDINGS

A detailed description of AOC-B, including the locations of soil borings, was given in Subsection 5.4.2.

6.4.1 Field Screening Results

Screening of soil samples from AOC-B using the PID or field GC was not performed because the only contaminant of concern was lead.

6.4.2 Nature of Soil Contamination

Three soil borings were drilled at AOC-B, from which six investigative samples were collected for laboratory analysis. The borings were drilled and samples collected on 3 June 1994. Sampling intervals submitted for laboratory analysis and the analytical program are presented in Table 6.6. A complete listing of laboratory results for all analyses at AOC-B is given in Appendix E.

6.4.2.1 Lead Contamination

Lead detected in soils collected at AOC-B is shown in Table 6.7. Lead was detected in all six soil samples collected at AOC-B, at concentrations ranging from 4.9 to 43 mg/kg. The two highest concentrations detected were from the same boring, namely B-001BH.

Table 6.6
Soil Sampling and Analytical Program for AOC-B
220th EIS, Zanesville ANGS, Zanesville, Ohio

Sample Location Number	Sample Depth (ft BLS)	Soil Analysis and Method
		Lead (SW7421)
B-001BH	0.5 - 1.5	X
B-001BH	5.5 - 6.5	X
B-002BH	0.5 - 1.5	X
B-002BH	10.5 - 11.5	X
B-003BH	0.5 - 1.5	X
B-003BH	5.5 - 6.5	X

AOC – Area of Concern.
BH – Borehole.
ft BLS – feet Below Land Surface.

Table 6.7
Lead Detected in Soil Samples at AOC-B
220th EIS, Zanesville ANGS, Zanesville, Ohio

Sample Location Number	Sample Depth (ft BLS)	Lead (mg/kg)
B-001BH	0.5 - 1.5	43
B-001BH	5.5 - 6.5	42
B-002BH	0.5 - 1.5	5.3
B-002BH	10.5 - 11.5	6.2
B-003BH	0.5 - 1.5	7.9
B-003BH	5.5 - 6.5	4.9

AOC – Area of Concern.
BH – Borehole.
ft BLS – feet Below Land Surface.
mg/kg – milligrams per kilogram.

SECTION 7.0 CONCLUSIONS

7.1 SUMMARY

ANGRC/CEVR authorized OpTech to prepare a PA/SI Work Plan and conduct PA and SI activities at the 220th EIS, Zanesville ANGS, Zanesville, Ohio. The PA was initiated by ANGRC and OpTech personnel in November 1993, during which two AOCs were identified for further investigation based on past waste handling and disposal practices. Field SI activities were conducted as outlined in the PA/SI Work Plan submitted to ANGRC in April 1994. The SI at the 220th EIS commenced on 1 June 1994 and was completed on 3 June 1994.

The field work at the 220th EIS was accomplished by completing the following tasks:

- Drilling ten soil borings to determine whether contamination exists at each AOC;
- Submitting a total of 14 soil samples for analysis of VOCs, SVOCs, priority pollutant metals and TPH, and six samples for analysis of lead; and
- Surveying the location and elevation of all soil borings.

The evaluation of analytical results obtained from the 18 samples entails comparison to applicable, relevant and appropriate requirements (ARARs). The OEPA has set an action level for TPH in soils at 105 ppm. No such levels have been set by OEPA for VOCs, metals, or PAHs in soil. For these contaminants in soil, Ohio applies risk-based cleanup levels (also known as preliminary remediation goals or PRGs), determined in accordance with the EPA's Risk Assessment Guidance for Superfund (Rochotte, 1994). The OEPA has provided a report containing PRGs developed for another site, specifically a U. S. Department of Energy facility in southeastern Ohio (Science Applications International Corp., 1993). Included in this report are PRGs for many of the contaminants of concern detected at the two AOCs at Zanesville ANGS.

For metals contamination, data from a United States Geological Survey (USGS) Report (Shacklette and Boerngen, 1984), which describes naturally-occurring metals concentrations in soils across the United States, may also be used for comparison purposes.

7.2 MOTOR POOL WASHDOWN AOC CONCLUSIONS

7.2.1 Soil Contamination

The VOC acetone was detected in ten of 14 soil samples collected at AOC-A. The maximum detected concentration was 52 μg/kg. This analyte likely represents laboratory contamination, since common laboratory solvents such as acetone, methylene chloride, 2-butanone, and hexone are known to occur as false positive identifications in VOC analyses (USEPA, 1993), and also since acetone was detected in the method blank associated with all soil samples in which acetone was detected. The VOC tetrachloroethene was detected in two soil samples, with the maximum detected concentration being 17 μg/kg. This is well below the OEPA-provided PRG of 20,000 mg/kg for tetrachloroethene in soil.

SVOC contamination, specifically PAH compounds, was detected in two of 14 samples, namely A-005BH (0.5 - 1.5 feet BLS) and A-006BH (0.5 - 1.5 feet BLS). The highest concentrations were detected in sample A-006BH (0.5 - 1.5 feet BLS), namely benzo(a)anthracene at 2,200 μg/kg, benzo(b)fluoranthene at 1,700 μg/kg, benzo(k)fluoranthene at 1,800 μg/kg, benzo(a)pyrene at 2,100 μg/kg, chrysene at 1,800 μg/kg, fluoranthene at 4,000 μg/kg, and pyrene at 2,600 μg/kg. As shown in Table 7.1, the concentration of only one of these PAHs, the carcinogen benzo(a)pyrene, exceeds OEPA-provided PRGs.

Table 7.1
Summary of Analytes Exceeding Action Levels
220th EIS, Zanesville ANGS, Zanesville, Ohio

AOC	Sample Location and Interval (in ft BLS)	Analyte	Concentration	Standard Exceeded	Action Level Concentration
A	A-006BH 0.5 - 1.5	Benzo(a)pyrene	2,100 μg/kg	OEPA PRG	88 μg/kg
	A-004BH 0.5 - 1.5	TPH	1,600 mg/kg	OEPA	105 mg/kg
	A-005BH 0.5 - 1.5	TPH	370 mg/kg	OEPA	105 mg/kg
	All samples	Arsenic	2 - 16 mg/kg	OEPA PRG	0.37 mg/kg
		Beryllium	0.6 - 1.2 mg/kg	OEPA PRG	0.15 mg/kg

AOC – Area of Concern.
ft BLS – feet Below Land Surface.
BH – Borehole.
μg/kg – micrograms per kilogram.
OEPA – Ohio Environmental Protection Agency.
PRG – Preliminary Remediation Goals.
TPH – Total Petroleum Hydrocarbons.
mg/kg – milligrams per kilogram.

TPH contamination was detected in seven of 14 soil samples. Concentrations ranged from 4.4 to 1,600 mg/kg. As shown in Table 7.1, the TPH concentration exceeded the OEPA action level for TPH of 105 mg/kg in two samples collected near the surface.

The average and maximum concentrations of metals detected in soils collected at AOC-A are presented in Table 7.2. These values are compared with reported naturally-occurring metals concentrations and with the OEPA PRGs. As presented in Table 7.2, the average concentration for each metal detected at AOC-A is below or within the range of naturally occurring concentrations, except for zinc, whose average is only slightly higher than natural levels. The maximum concentrations detected for the metals arsenic, cadmium, copper, and zinc are slightly above the natural levels. In comparison to OEPA PRGs (see Tables 7.1 and 7.2), only two metals, the carcinogens arsenic and beryllium, exceed these limits.

Table 7.2
Comparison of Metals Detected in Soil Samples at AOC-A to Naturally-Occurring Concentrations of Metals in East-Central Ohio and OEPA PRGs
220th EIS, Zanesville ANGS, Zanesville, Ohio

Metal	Number of Detects in 14 Soil Samples	Detected Concentrations at AOC-A (mg/kg)		Range of Naturally-Occurring Concentrations in Soils for East-Central Ohio[†]	OEPA PRG[‡] (mg/kg)
		Avg.	Max.		
Arsenic	12	7.6	16	10	0.37
Beryllium	13	0.79	1.2	1 - 1.5	0.15
Cadmium	14	0.44	2.6	0.32 - 0.64	140
Chromium	14	9.1	30	100 - 2,000	1,400
Copper	14	20.6	35	30	ND
Nickel	12	12.3	17	30 - 700	5,400
Lead	14	11.3	23	30 - 700	ND
Antimony	3	4.5	5.7	1 - 8.8	110
Selenium	2	0.5	0.6	0.3 - 0.7	1,400
Zinc	14	51	96	45	81,000

AOC-A – Motor Pool Washdown Area of Concern.
OEPA PRG – Ohio Environmental Protection Agency Preliminary Remediation Goals.
mg/kg – milligrams per kilogram.
[†]Source: Schacklette and Boerngen, 1984.
[‡]Source: Science Applications International Corp., 1993.
ND – No data available.
Avg. – Average.
Max. – Maximum.

7.3 BATTERY NEUTRALIZATION AOC CONCLUSIONS

7.3.1 Soil Contamination

Lead was detected in all six soil samples form AOC-B, with the highest concentration of 43 mg/kg detected in sample B-001BH (0.5 - 1.5 feet BLS). The average concentration of lead at

AOC-B was 18.2 mg/kg. Both the maximum and average detected concentrations are within the range of naturally occurring concentrations of lead for east-central Ohio (Shacklette and Boerngen, 1984).

SECTION 8.0 RECOMMENDATIONS

8.1 MOTOR POOL WASHDOWN AOC RECOMMENDATIONS

Although action levels were exceeded for benzo(a)pyrene, TPH, arsenic and beryllium in two soil samples, the magnitude and extent of contamination has been sufficiently determined, and groundwater is not at risk. Therefore, based on the results of the PA/SI conducted, further investigation is not required at this AOC.

8.2 BATTERY NEUTRALIZATION AOC RECOMMENDATIONS

Based on the results of the PA/SI conducted, lead was not detected above naturally occurring levels for the area. Therefore, no additional IRP activities are warranted at AOC-B.

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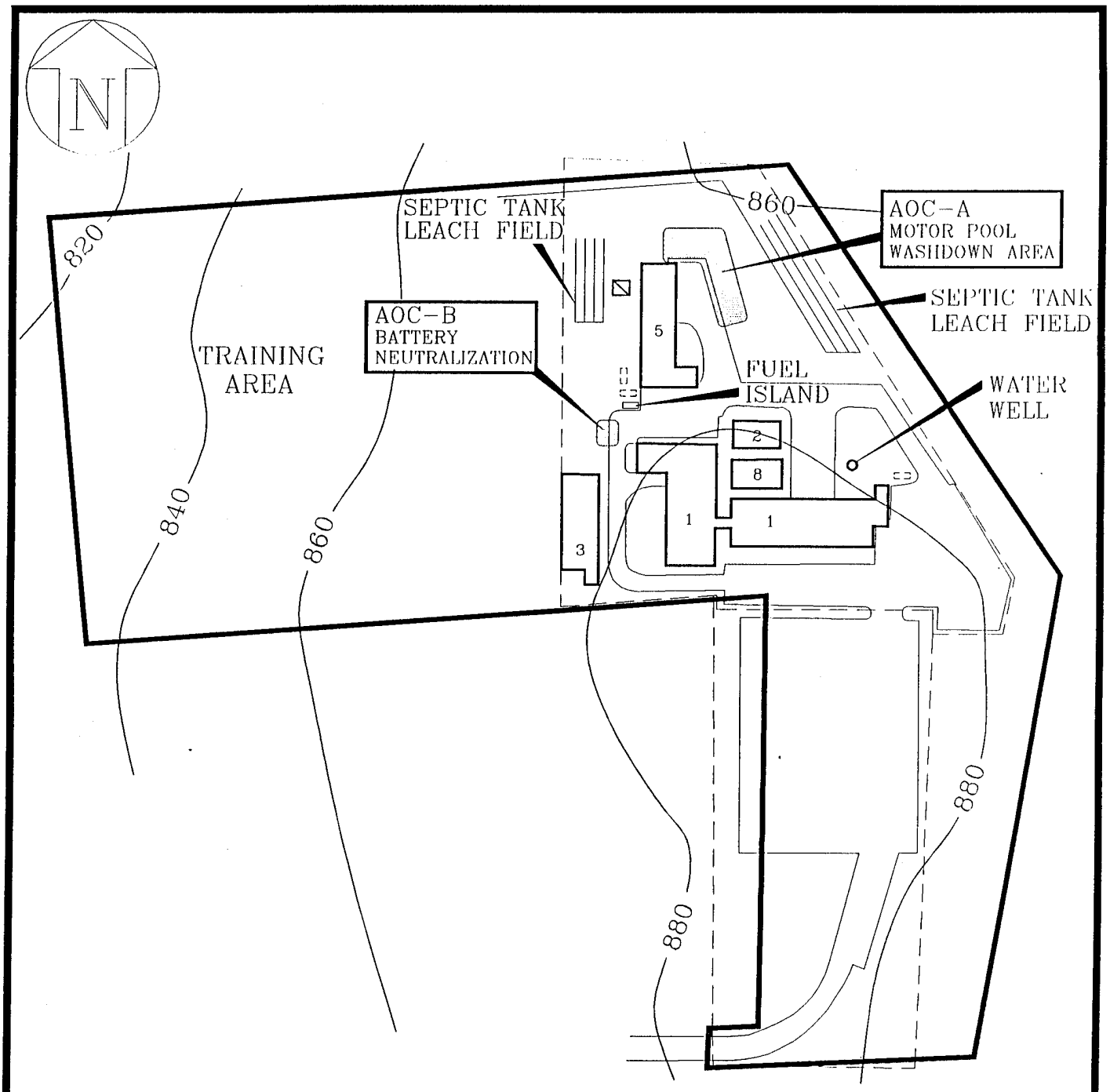

SOURCE: 220th EIS MAP, 1993.

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